FOOD Manufacture

PUMPS AND PUMPING EQUIPMENT

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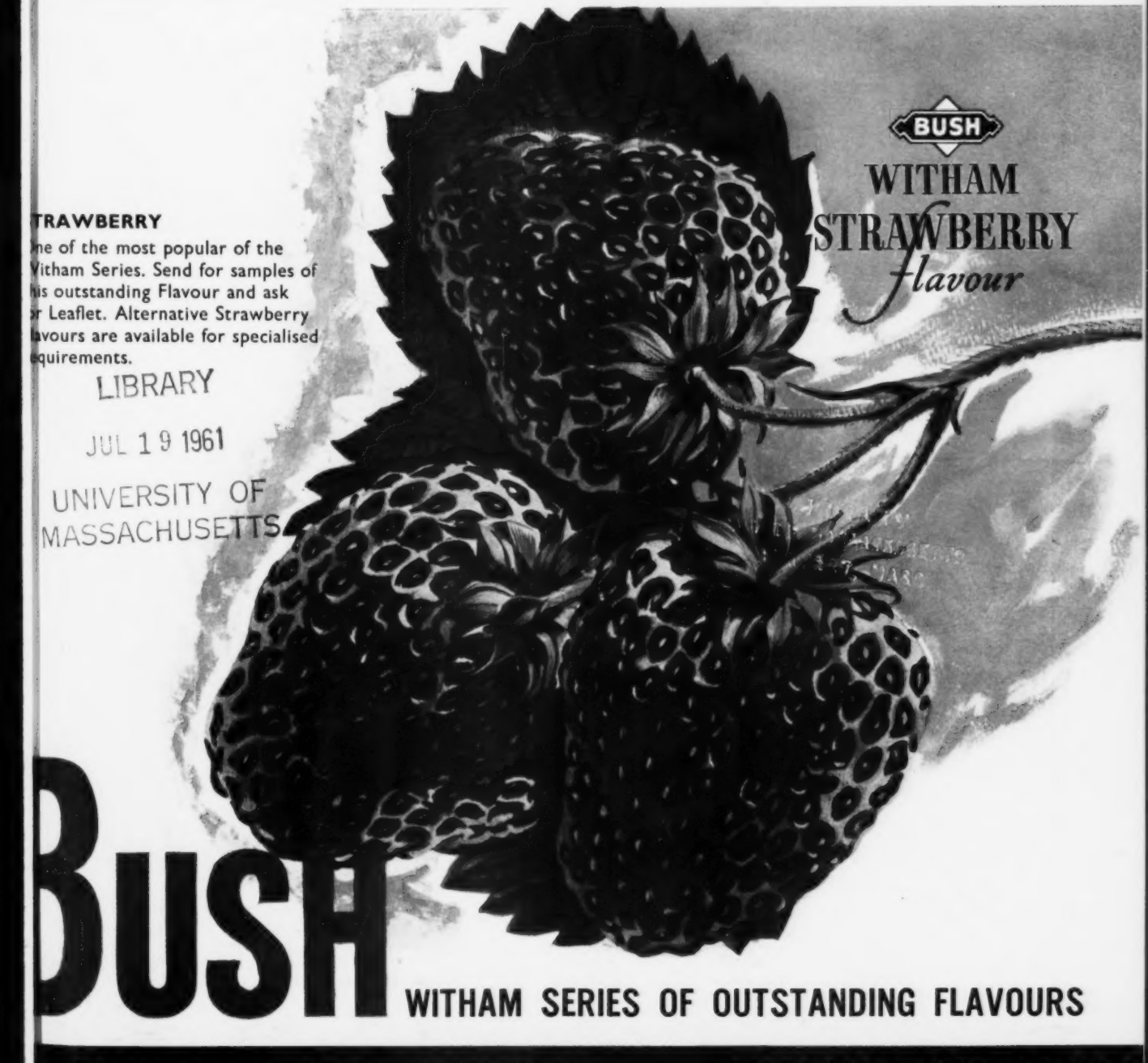
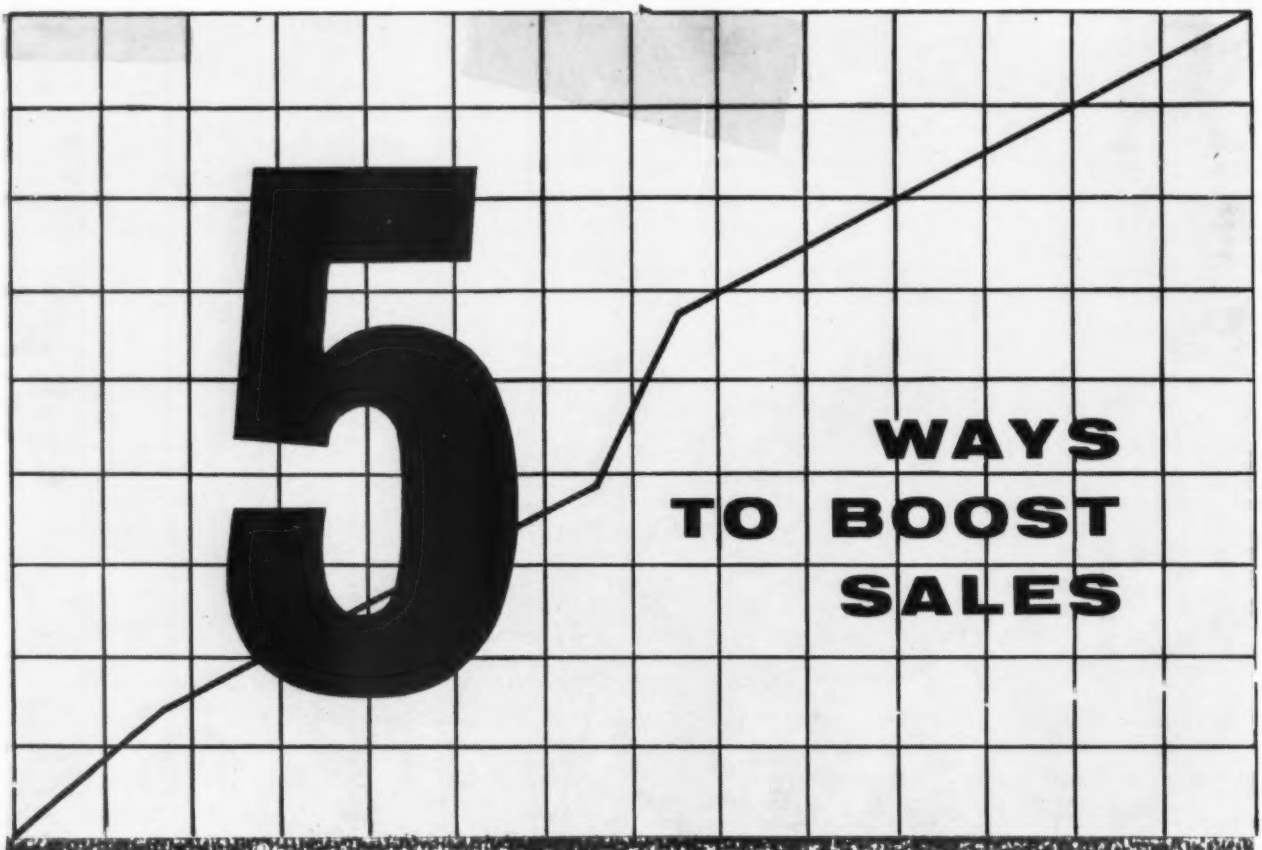
A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP

Vol. 36 No. 7 JULY 1961





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Food Technology

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True to type—Coconut, Hazel Nut, Almond, Walnut, Pistachio and Nuts & Wine.

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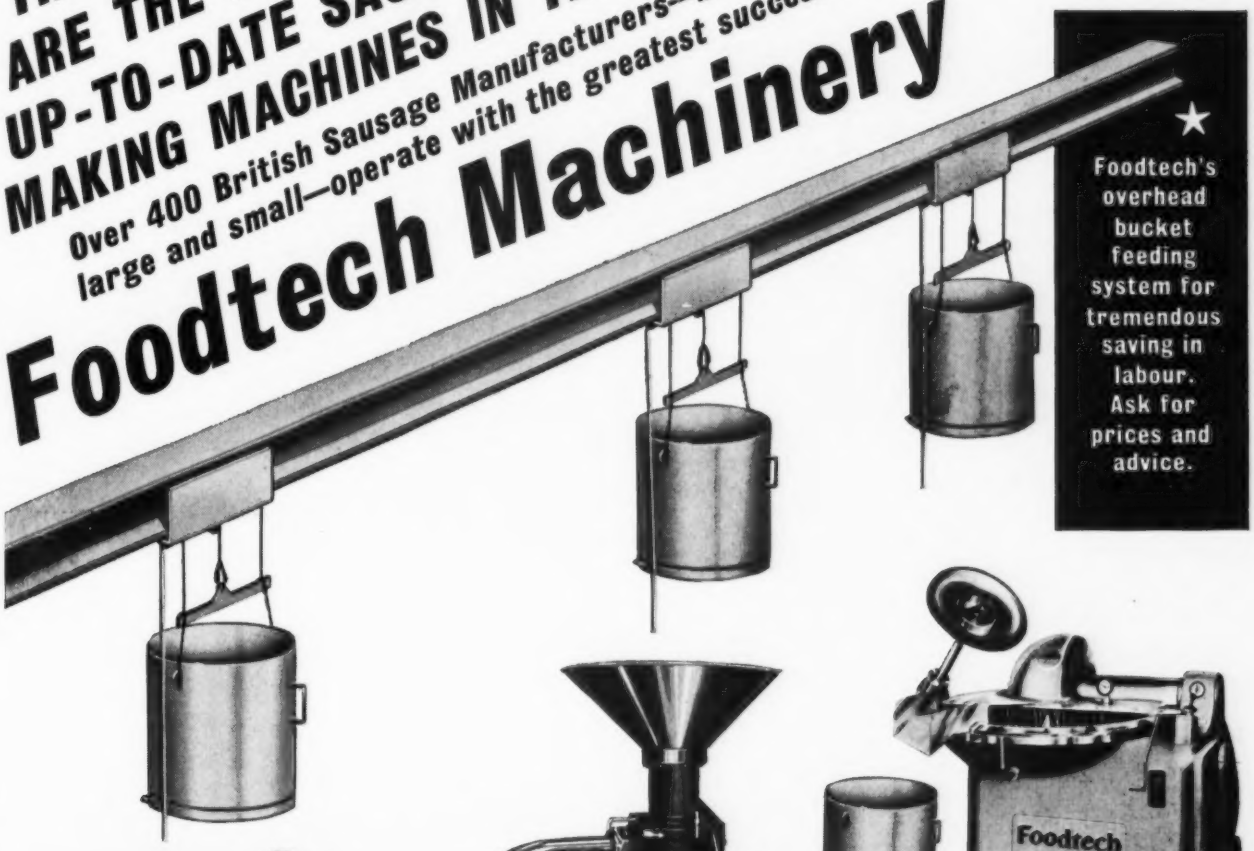

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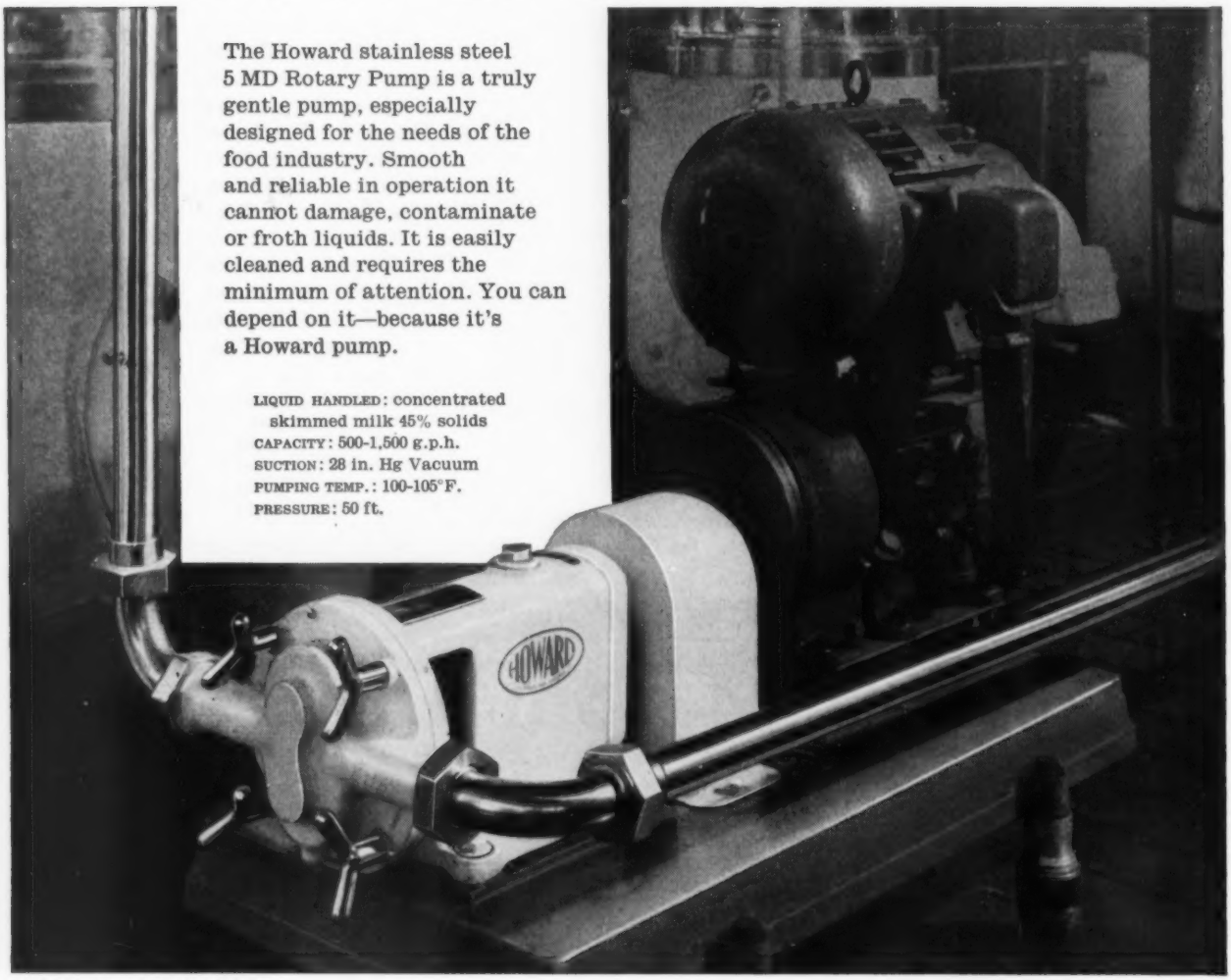

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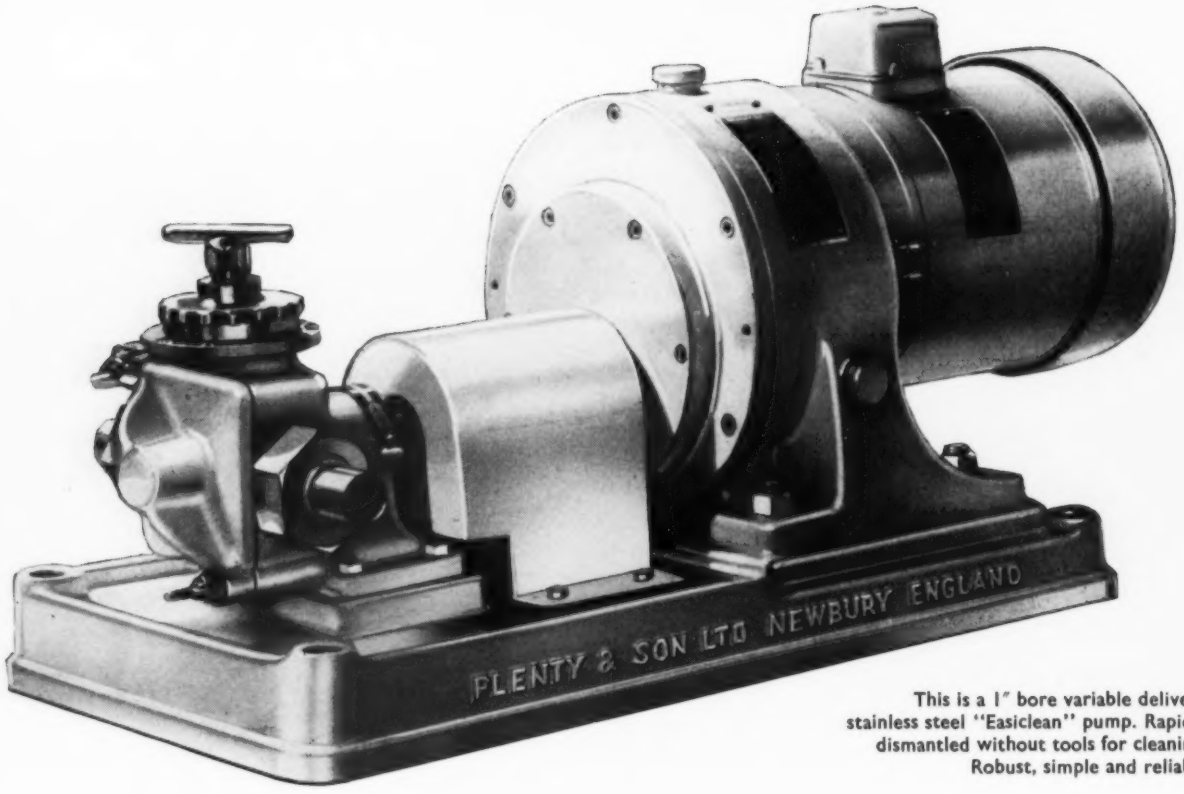

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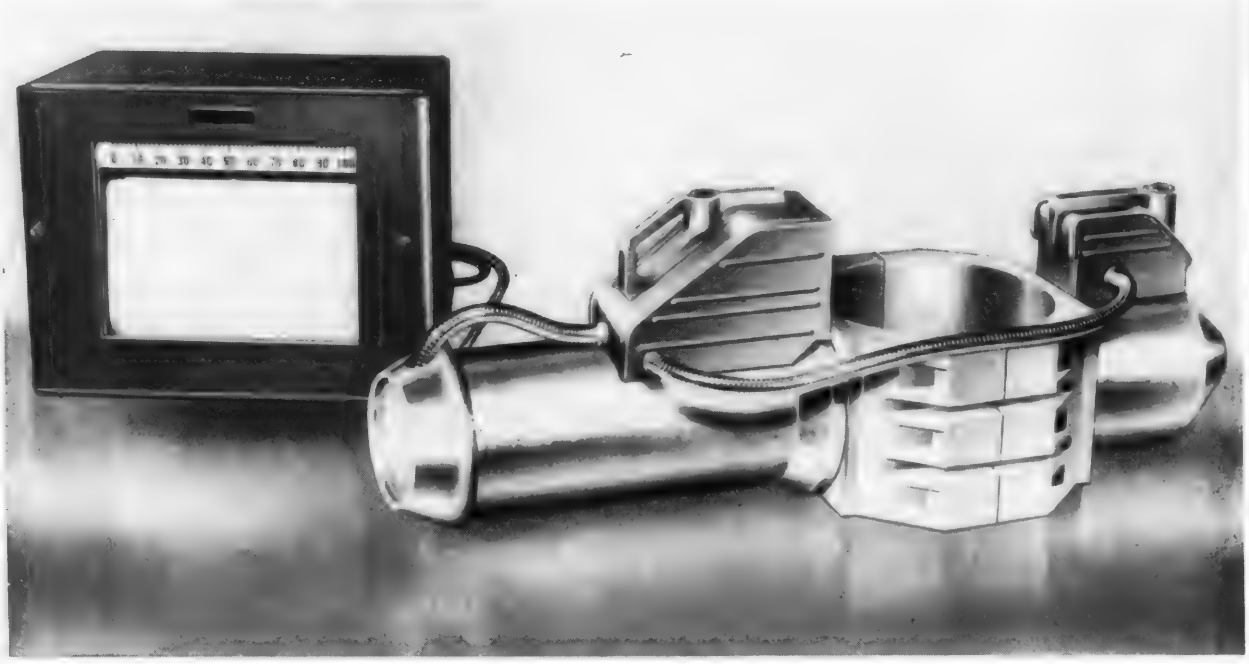

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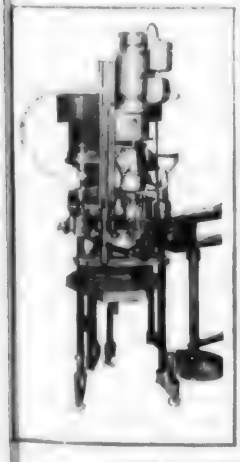

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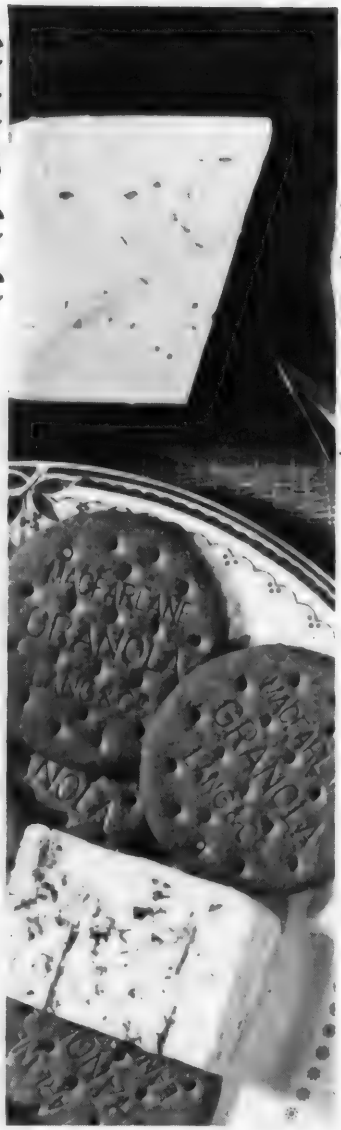
before it reaches the table



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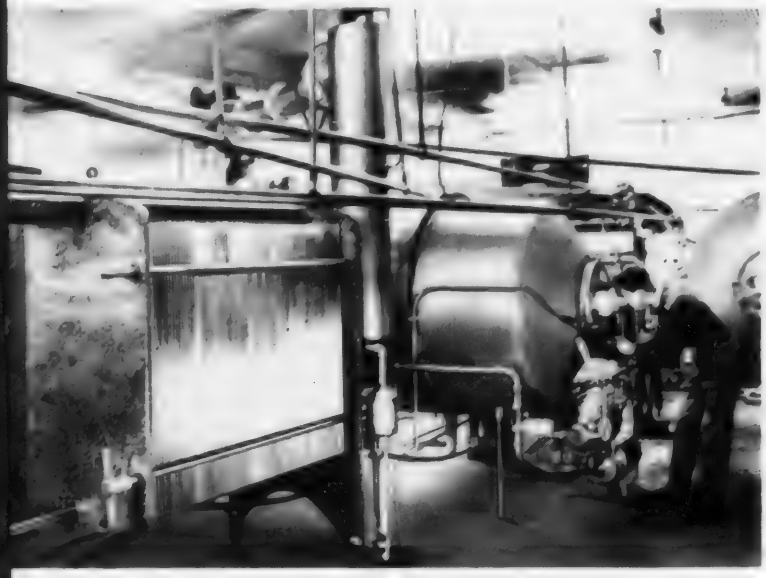

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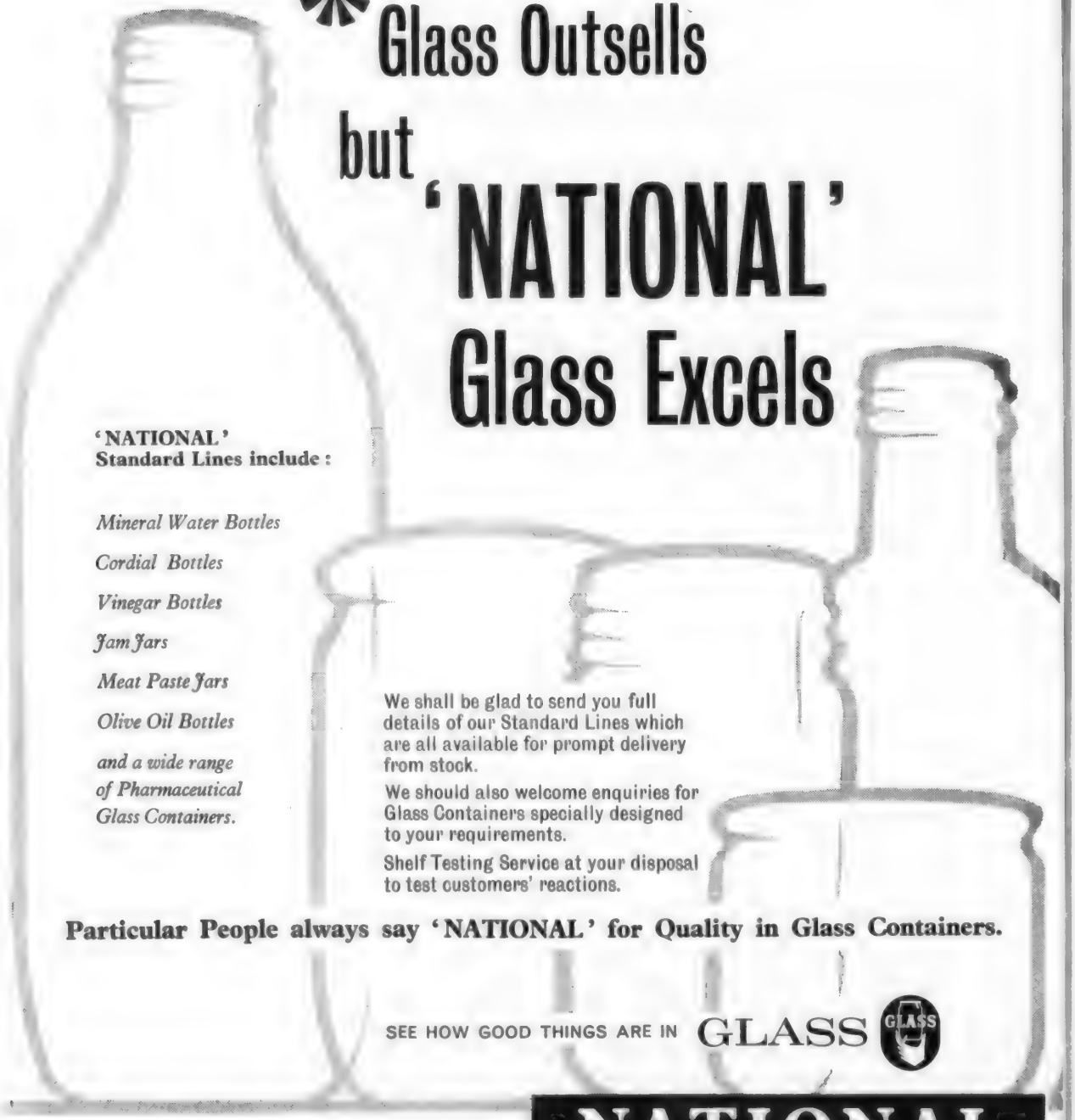

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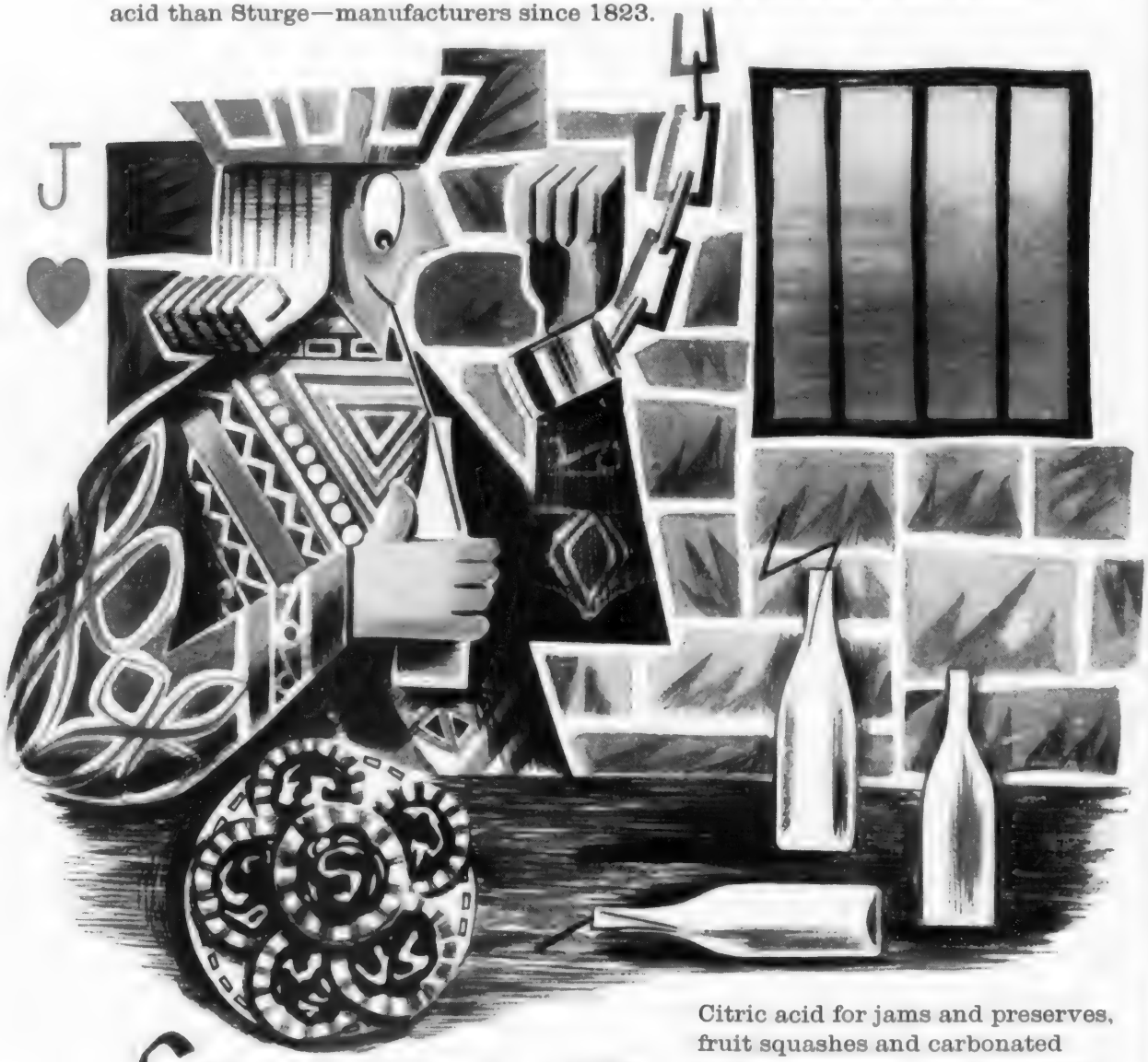

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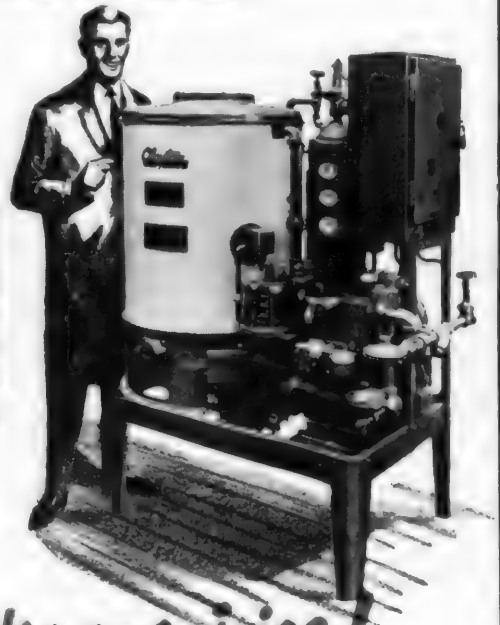

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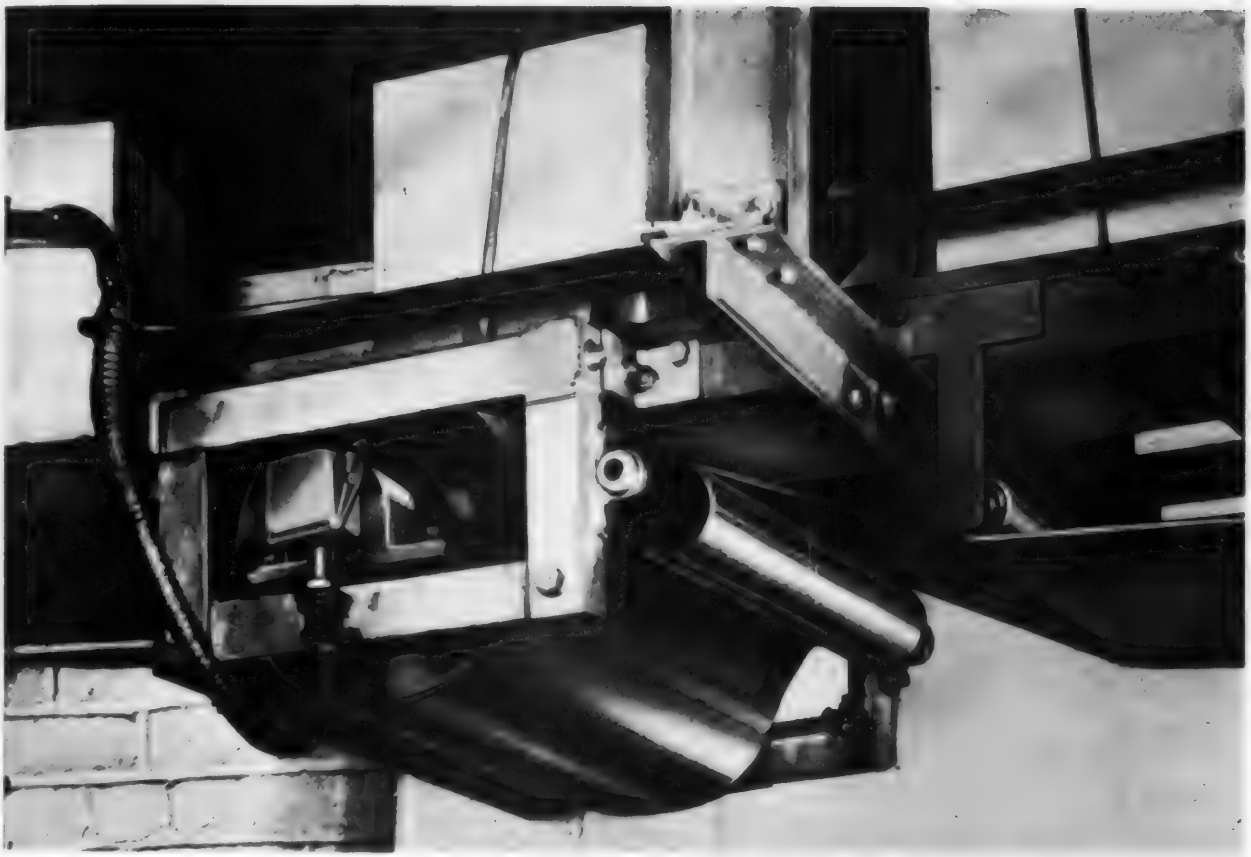

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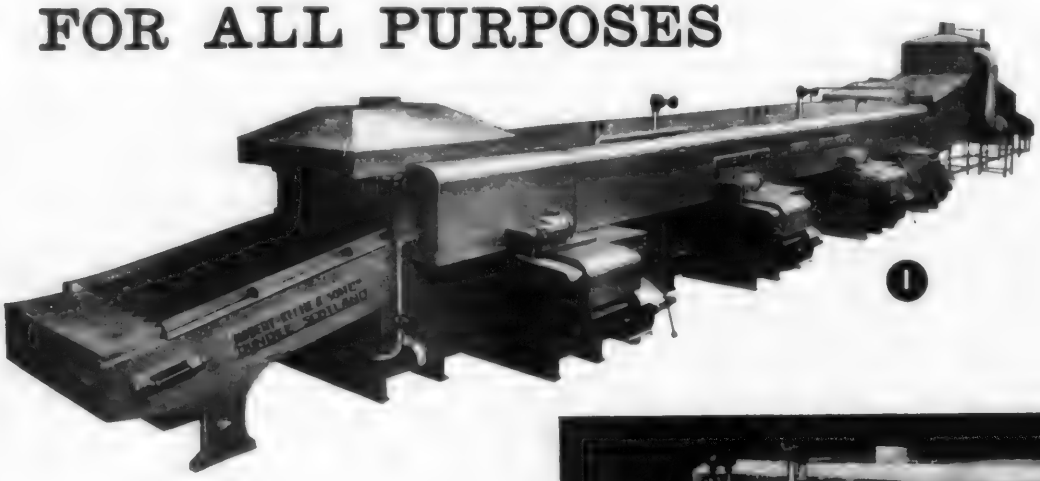

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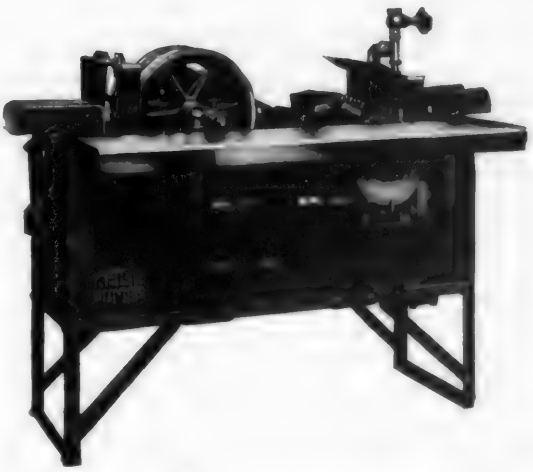

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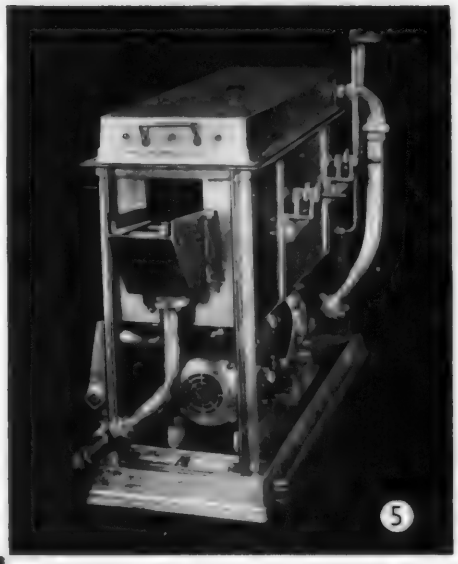

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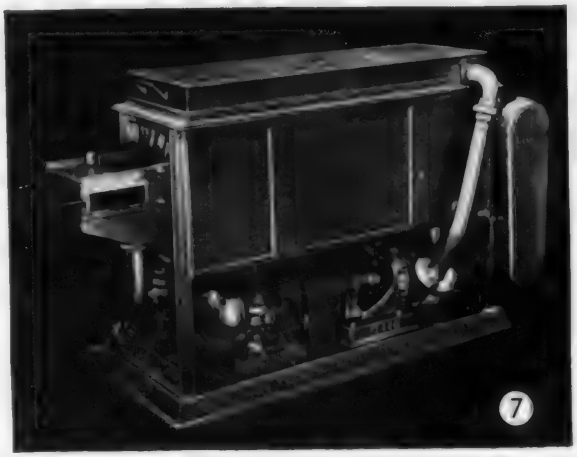

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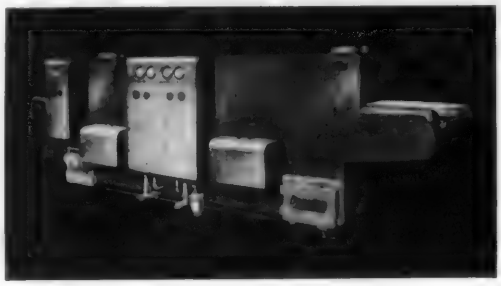

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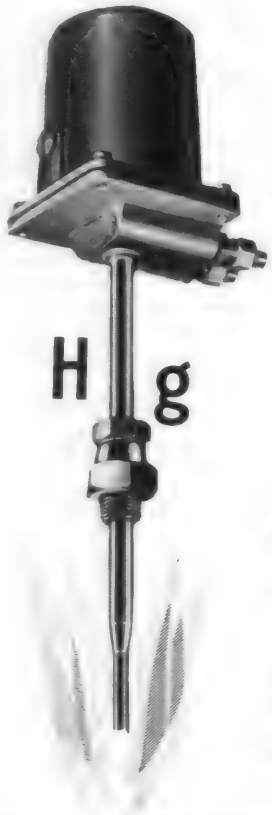

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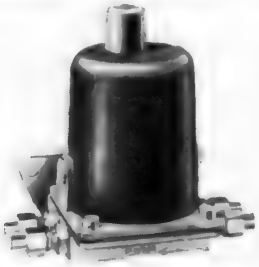
"On plant" mercury-in-steel air-operated proportional temperature controller. *Publication No. R39*



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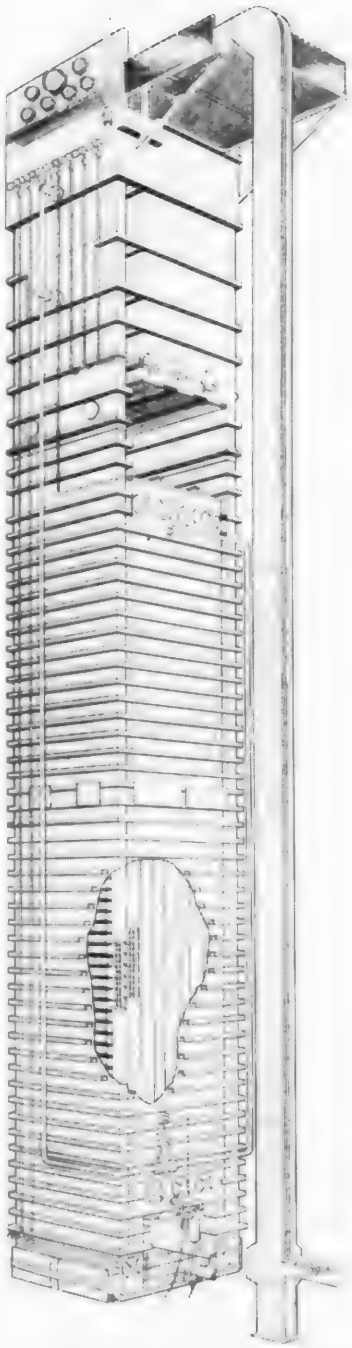

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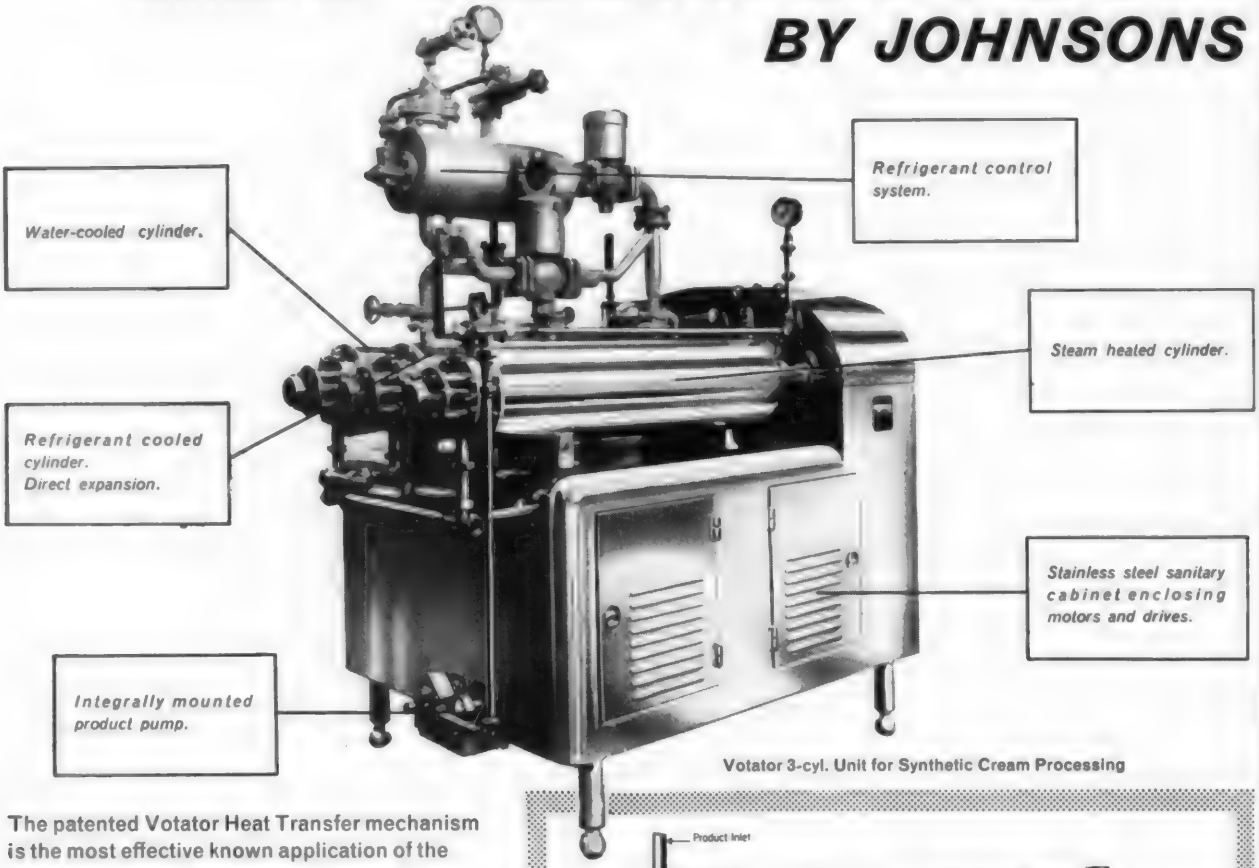
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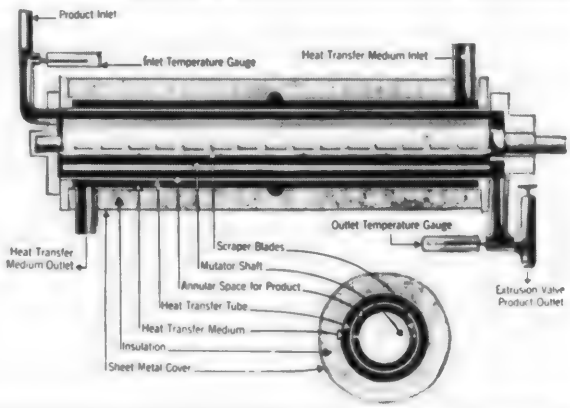
The patented Votator Heat Transfer mechanism is the most effective known application of the theory that a clean heat transfer surface, combined with a high ratio of surface to volume of material being treated, gives the best results in the rapid cooling or heating of a continuous flow of liquid or viscous products.

Shown here is a Votator 3-cylinder unit for the rapid heating and cooling of synthetic cream. It is one of many Votator units made by Johnsons for rapid, hygienic and continuous cooling or heating of a great variety of food and confectionery products. A Votator Unit may solve your processing problem. Johnson's engineers and their Votator Pilot Plant Laboratory are ready to help you.



VOTATOR SYSTEMS HAVE THIS HEAT TRANSFER MECHANISM

This mechanism provides a large heat transfer area in relation to the volume of material being treated. It maintains that very desirable balance by constantly scraping the heat transfer surface clean.
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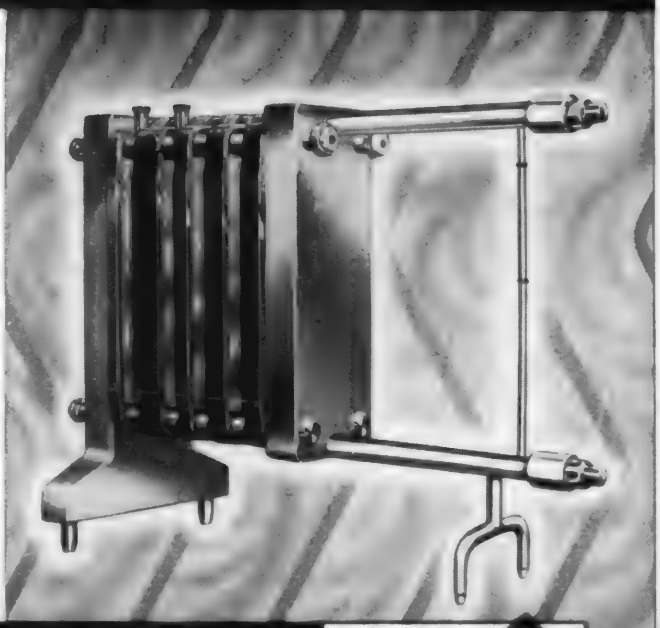

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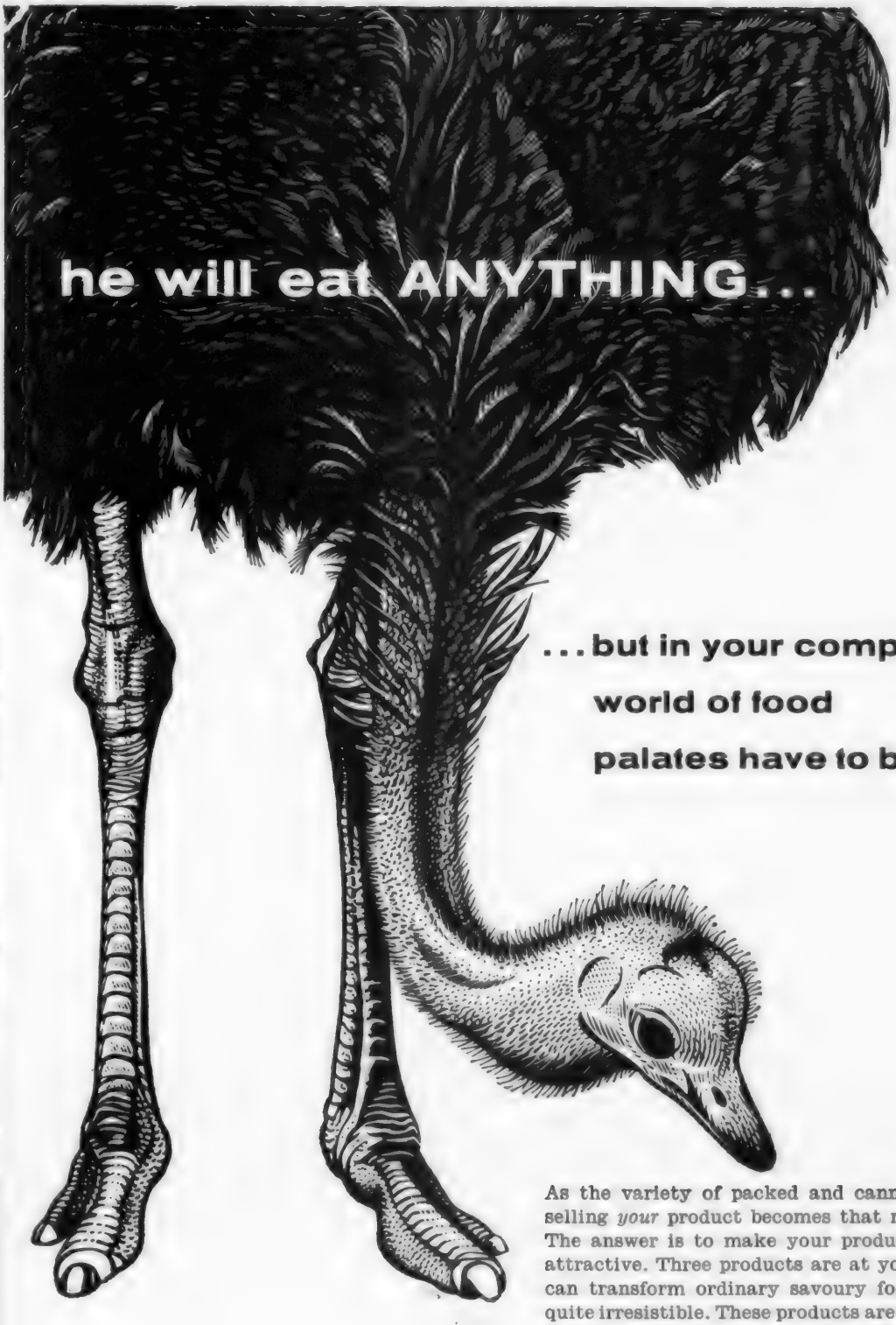

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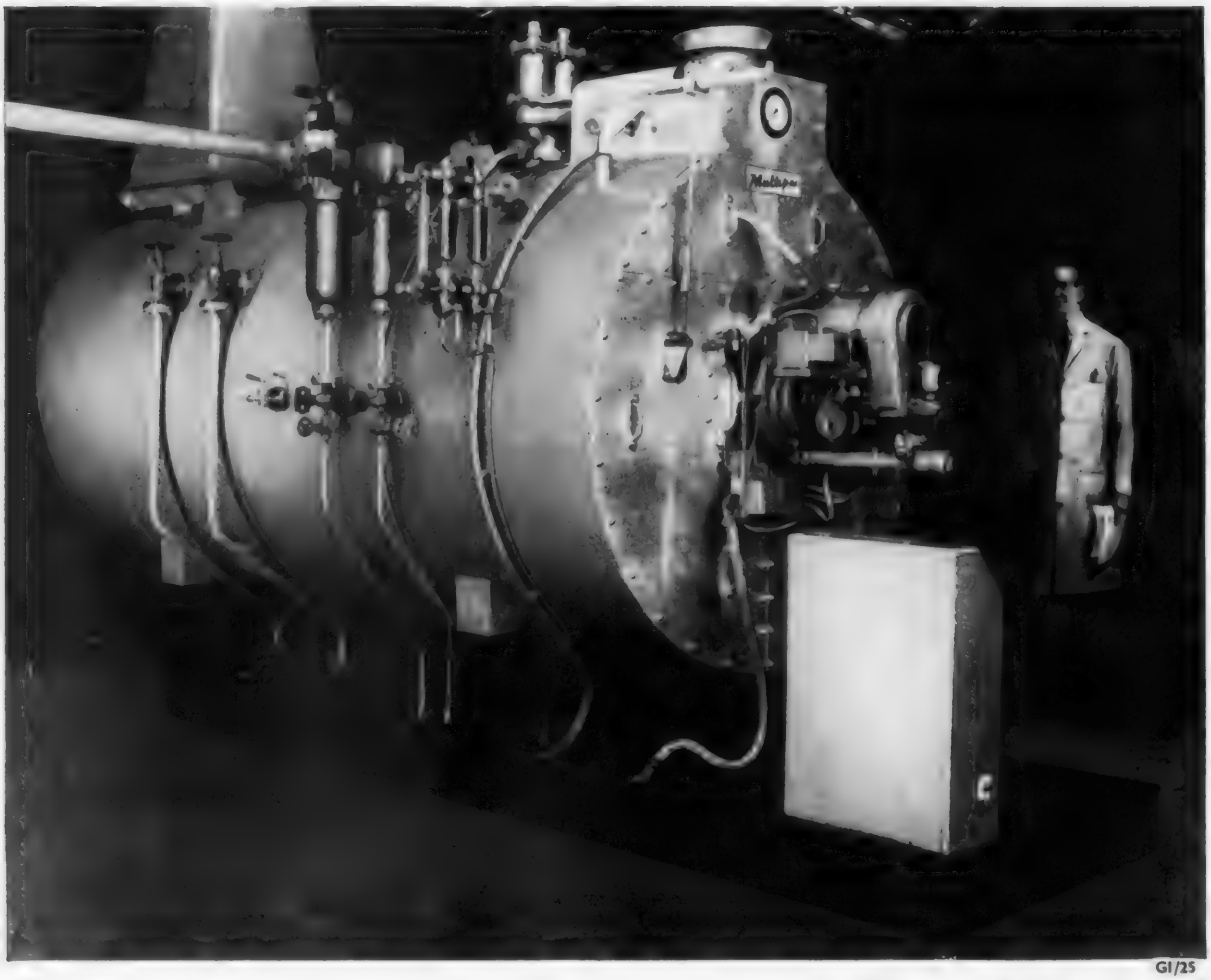

GI/25

'Darvic' panelling makes it easier and cheaper to maintain a high standard of hygiene

'Darvic' p.v.c. sheet has been used to panel all the walls in the Wet Fish shop and in the frying area of the Restaurant, designed and specified by Albert E. King, M. Inst. R. A., Architect and Surveyor, Ely, and built by F. W. Cocksedge, Mildenhall, for Mr. O. Smushall, St. Andrew's Street, Mildenhall, Suffolk.

The panelling on the walls of this Fish Restaurant and Fish Shop in Suffolk will keep its glossy, easily cleaned surface year after year without painting and with the minimum of maintenance. The large panels are surprisingly tough, completely unaffected by moisture and will not corrode. They are easy to cut and fit and can be cemented to walls or secured to supporting battens. The panels shown are joined with extruded p.v.c. strips and therefore there are no gaps between the sheets nor screw holes to catch the dust. Because 'Darvic' has a low thermal conductivity, it is also used to panel cold stores and refrigerated display cabinets. 'Darvic' makes the ideal panelling material wherever food is stored or served. Specify 'Darvic' rigid p.v.c. sheet for your panelling.

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'Darvic' is the registered trade mark for the rigid p.v.c. sheet manufactured by I.C.I.

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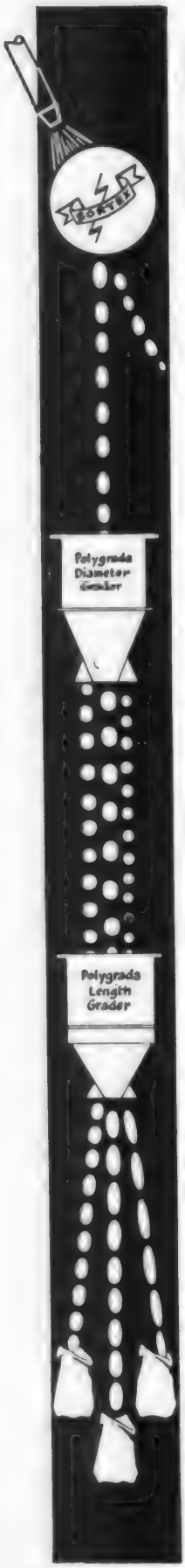

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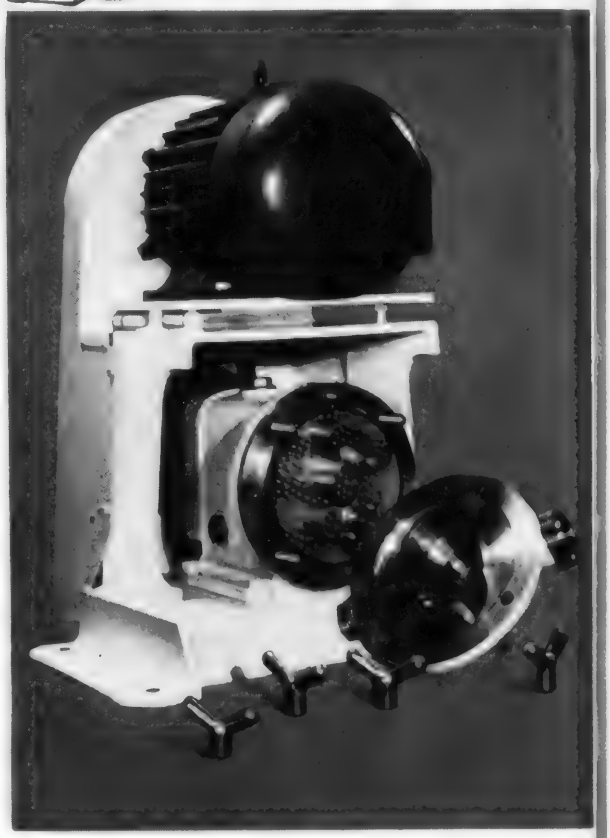

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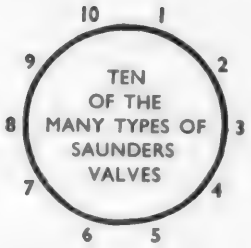

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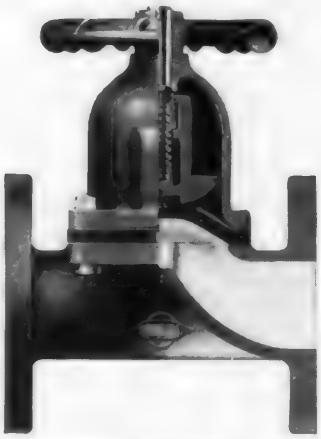

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If you need information or advice on any chemical problem, ask Berk about it. Somewhere in the wide range of Berk literature, the answer may already exist; and if it does not, Berk experts will gladly set to work to find it. Write or telephone:

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FOOD
Manufacture

Volume 36. Number 7 Editor: Anthony Woollen, B.Sc., A.R.C.S., A.R.I.C. July 1, 1961

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A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP—ENGLAND: LEONARD HILL HOUSE, EDEN ST., LONDON, N.W.1, EUSTON 5911. (Telegrams: LENARDIL, NORWEST, LONDON). UNITED STATES: 2515, BEVERLY BLVD., LOS ANGELES 57, CALIFORNIA, DUNKIRK 1-2241; 681, MARKET STREET, SAN FRANCISCO 5, CALIF., EXBROOK 2-2612; 510 FIFTH AVENUE, ROOM 611, NEW YORK 17, N.Y., YUKON 6-2477; 332, WEST HARRISON STREET, OAK PARK, ILLINOIS, COLUMBUS 1-7906; 1501, EUCLID BUILDING, ROOM 426, CLEVELAND 15, OHIO, TOWER 1-2280; 1214, VILLA DRIVE N.E., ATLANTA. GA., TRINITY 2-2969. ITALY: VIA FILIPPO TURATI 3, (PALAZZO GIARDINO), MILAN. SWEDEN: TUNNELGATE 19B, STOCKHOLM. DENMARK: PALAEGADE 7, 3 SAL. COPENHAGEN-K. NYGAARDSPLADS 8, BRONDBYOSTER, PR VALBY.

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AA430

Number 35 July 1961

Glossary of Terms

LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

This advertisement is one of a series of Information Bulletins issued by Loders & Nucoline Ltd. Copies are available, together with a folder, on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

Coconut Oil (See Bulletin numbers 1 and 2).

This is an edible oil obtained in very large quantities from the kernel of the fruit of the Coconut Palm.

Coconut Wax (See Bulletin number 2).

This is a mixture of natural waxes which occur in very small amounts in Coconut Oil.

Cooling Curve

A Cooling Curve illustrates a temperature/time relationship obtained when a fat is solidified under standard conditions. It is usually applied to fats of the Cocoa Butter type.

Complete Fusion (See Bulletin number 19).

The various glycerides of a fat or oil usually melt at different temperatures, and the point at which all glycerides become liquid is known as the Complete Fusion point. This point is also taken as representing the end of the plastic range.
(Refer also to definition of "Melting Point").

Copra (See Bulletin number 1).

After harvesting, coconuts are split open, the meat removed and then dried either by the sun or some form of hot air. The resultant material is Copra.

Cottonseed Oil (See Bulletin number 7).

This is the oil expressed from the seeds of the Cotton Plant. It is a liquid oil which deposits solid stearine on standing.

Couverture

This is the term applied to a product manufactured with Cocoa Butter, cocoa-mass, milk powder (or milk), sugar and flavouring. In some cases, it is practice to replace part of the Cocoa Butter content with Coberine or Veberine.

Crude Oil

A Crude Oil is an oil obtained from a natural source, before any refining process has taken place. In some cases, a partially refined oil is referred to as Crude Oil.

Deodorising (See Bulletin number 10).

This is the final process in the refining of oils and fats. It is the removal of all odoriferous compounds remaining after the neutralising and bleaching operations have been carried out.

Dilatation (See Bulletin number 20).

This is the expansion due to melting when heat is applied to a solid fat.

Drop Point (See Bulletin number 19).

This is the temperature at which the first drop of melted fat is observed to fall from the orifice of a special cup holding a sample of fat when heat is applied.
(Refer also to definition of "Melting Point").

Emulsion

An Emulsion is an intimate mixture of two liquids which do not normally mix. It consists of minute globules of one liquid suspended in the other liquid. The breaking down of an emulsion into two distinct layers usually occurs over a relatively long period.

Esterification

In oils and fats, a triglyceride is a compound formed by the combination of one molecule of glycerol (glycerine) and three molecules of fatty acid. The reaction is known as Esterification.

Ester Value (See Bulletin number 14).

The Ester Value is a measure of the combined fatty acids present in an oil or fat.

Eutectic

A Eutectic is a mixture of two fats (or any other substances) in which the physical characteristics (i.e. setting point, melting point, etc.) are lower than those of the components.

FOOD
Manufacture

Vol. 36, No. 7 July 1, 1961

Britain leads in A.F.D.

ON MAY 24 the accelerated freeze-drying plant of the Irish Sugar Corporation at Mallow was opened by the Prime Minister of the Irish Republic. We were privileged to be there, and a report of the proceedings and an account of the plant are given on other pages. Being a patriotic Briton, we are glad that in this field British technologists are in the lead. So often British initiative fails to gain credit because we as a race are notoriously bashful at telling the world about ourselves; there is another nation which speaks the same language of which the reverse is frequently true, and this often leads to situations such as the following, which concerns a well-known food manufacturing firm in this country.

This firm, possibly as a result of reading FOOD MANUFACTURE, discovered that there was something in this thing called accelerated freeze-drying. Without more ado they decided they must obtain more information. So what did they do? They sent several of their technical experts off to the U.S.A. to get it. These experts were parked on this firm's associate company in that country. The Americans quickly discovered that the experts knew more about A.F.D. than they did themselves, so held on to them while they picked their brains. We need say no more.

Mallow opens its doors

THE long-awaited opening of the first commercial A.F.D. plant to process solid food was, as the Irish Sugar Company's chairman, Mr. J. E. MacEllin, pointed out, an historic occasion. True, the Mallow plant is hardly more than a pilot plant, processing a mere 5 tons of raw material a day. Then too it can hardly be said to be "on stream," for much development work and experimentation remains to be done. On opening day there was not even a processing line in existence, merely an exhibition of some very new vegetable processing machines, some with the delivery labels still on. The demonstration of raw meat preparation by some attractive colleens was hardly likely to deceive anyone, for the plant is not at present equipped to turn out high-quality A.F.D. meat, there being no blast freezer. At present they are using evaporative cooling in the drying cabinets, which is all right for vegetables which have been scalded and which have plenty of free water adhering to them, but evaporative cooling of meat and fruit where most of the moisture is in the cells is likely to cause cell rupture and structural damage leading to a fall in quality, the very thing which the A.F.D. process (and quick-freezing) is designed to avoid.

These points are, however, details compared with the solid fact that A.F.D. has now happened. Of even greater significance than even this is that it may symbolise the turning of the economic tide in favour of the Irish. As was stated by Mr. Sean Lemass, Eire's Prime Minister, in his opening address, the development which was inaugurated at Mallow on May 24 may prove to be the beginning of a new era for the smaller Irish farmers, and one of the most important means of strengthening their economy.

We are not Irish but we have visited the land of Erin several times, and have been saddened by the empty acres and dwindling townships. Far too many of Ireland's talented people have left the land of their birth and have been absorbed into the amorphous industrial hurly-burly of Britain and the U.S.A. The effect on Irish individuals themselves has not always been beneficial. The effect on Ireland's health as a nation has been disastrous. For a century her emigration rate has exceeded her birthrate, so that her population has steadily declined, until at present it is less than one third of that of London.

This slow bleeding to death has got to stop sometime. Irishmen must stop arguing among themselves and must get down to establishing native industries to provide the Irish worker with a decent job and sufficient cash to make him stay at home. The fruits of modern technology must be channelled into the country so that living standards are raised and young Irish people can marry at an early age with the prospect of homes of their own (the average age at which Irishmen marry is 34, and the Irish birthrate is among the world's lowest). The A.F.D. plant at Mallow is, we hope, a sign that a change in all this is imminent.

B.I.B.R.A.'s director

THE APPOINTMENT of Dr. Leon Golberg as director of the embryonic British Industrial Biological Research Association is an important step in the association's progress. At present Medical Research Director of Benger Laboratories, Ltd., Dr. Golberg brings to his new post a diversity of qualifications and experience. His background is South African; he graduated as a chemist from Johannesburg's University at Witwatersrand in 1935, specialising in organic chemistry.

The following year he obtained an M.Sc. in physical chemistry. Two years in this country followed, during which he carried out organic chemistry research at Oxford under Sir Robert Robinson.

Returning to South Africa in 1939, his interests veered towards nutrition, biochemistry and medicine.

He established the biochemical laboratory of the Union Defence Force at the South African Institute for Medical Research, and worked there throughout the war on nutritional problems. After the war he came to this country again and studied medicine for six years. After qualifying in 1951 he became Senior Lecturer in chemical pathology at Manchester University. He has held his present post since 1955.

At 45, Dr. Golberg is the right age for a job of this nature. We wish him success in a task which will be a most challenging one.

Progress in pesticides

MERELY a slight contact with the life of the soil is enough to make one realise how insecure are the foundations on which our material life is based. This fact is largely hidden from the townsman, with his regular hours and steady salary, but is only too well appreciated by the countryman. The townsman who regards the countryside as a pleasant place in which to spend his precious moments of relaxation, who never goes there unless the weather is fine, regards the fields of waving corn with a benign gaze and takes them for granted, as he takes for granted that his salary cheque will be presented to him on the last day of the month. If he is a flat-dweller in one of our big cities (and more people in this island are than not) he probably knows little, and cares less how the corn got there; he probably has a vague idea about its connection with what he eats, but there the matter ends.

The householder with a garden has a much greater appreciation of our dependence on Nature. When greenfly attack his roses or blackcurrants, and slugs nibble his lettuces, he buys a garden spray and a slug-killing concoction, lets rip and hopes (usually in vain) that these pests will disappear. When they continue to nibble he sighs and determines to start the spraying and the slug baiting earlier next year, before these pests have got a hold.

Pests to the gardener merely mean a few cabbages less or roses not quite so good as they might be. But to the farmer they mean financial loss and to the community less food. An industrial community like ours which depends on imports for much of its food is cushioned from the effects of pests because if food supplies from one source diminish, more can usually be bought from another. But to less well-off agricultural communities subsisting on their own produce, pests bring hardship and want.

In the emotional outcry about the effects of pesticides on wild life currently going on in the correspondence columns of our newspapers, we see many expressions of grief for the birds killed through eating dressed seed but little sympathy for the farmer whose seed has been eaten. There is much questioning, too, about the long-term effects of pesticide residues on the soil and upon future crops, and one of the vital tasks of B.I.B.R.A. under its newly-appointed director will be to provide facts and figures to refute the pesticide critics.

There is no doubt that the number of pesticides is proliferating faster than our knowledge of their long-term effects. Yet the whole problem is bedevilled in the layman's mind by the sinister associations of the word "chemical," as if the whole of Nature were not founded upon chemistry.

We do not, however, know enough about Nature's chemistry to control it and at the same time always be confident that something unexpected will not happen. Manufacturers' tests are of necessity short term and related to the expediency of the moment. The task of B.I.B.R.A. will be to carry out the long-term work that alone will bring certitude of safety. As the recent House of Lords debate indicated, the public is becoming more and more interested and concerned in these problems.

Kariba misfortunes

ANOTHER example of the unexpected results that can occur when Nature is disturbed is the rapid growth of *Salvinia auriculata*, a fresh water weed, in the lake formed by the Kariba dam in Rhodesia. This weed has already covered one-seventh of the artificial lake since the dam was completed in June, 1959, and looks like being eager to cover the remainder in a very short time. If it does, the Rhodesia Government's fond hope of establishing a fishing industry on the shore of the lake will be dashed, as the lake fish will be starved of oxygen.

Once the weed has covered the surface it forms a mat on which other vegetation grows, until a mass is formed completely impenetrable to boats. All the hoped-for amenities of the lake, both commercial and tourist, look like being in jeopardy.

Two possibilities arise; one is to find a suitable non-poisonous weedkiller which will eliminate the weed but not the fish, and the other is to make the best of a bad situation and turn the weed to commercial account, if possible. Experiments have begun in an attempt to achieve the first, but the lake will probably have been completely covered by the time such a weedkiller has been found and tested. Regarding the second, the scientific correspondent of the *Daily Telegraph* suggests that it might be more satisfactory to crop the weed and extract from it edible protein.

The menace of the hidden microbe

THE DIFFICULTY which faces those whose task it is to implant the basic principles of hygiene into the lackadaisical heads of common folk is the fact that microbes are invisible to the naked eye, and "what the eye don't see the heart don't grieve over." This was well brought out by Mr. H. J. Bunker during his address on recent advances in microbiology to the S.C.I. Microbiology Group. He said that if microbes were as big as cockroaches there would be no problem. He instanced several cases of gross violations of hygienic principles which he had come across in factories. To these we could add others of our own experience, which all points to the regrettable fact that again and again people who should know better are, through ignorance, thoughtlessness or wilful neglect, jeopardising the health of countless people by promoting in various ways undesirable microbial activity.

There was for example the case instanced by Mr. Bunker when a batch of contaminated food was returned to the factory of origin. Women workers were put on to the job of unwrapping the food and bulking it; when the job was finished they went straight back on to wrapping the fresh production stuff, ensuring thereby that the contamination was transferred to the fresh product. Then there was the case of a firm who were perplexed because they could not understand where certain bugs with which they were being persistently troubled were coming from, and never saw the connection, until they were gently told, between the bugs and a dustbin, placed a yard from one of their storage pans, into which floor sweepings, decaying matter and other filthy rubbish was periodically tipped.

Instances like these could be multiplied. Incredible as it may seem in this day and age, there are people in responsible positions who show by their behaviour and attitude an apparently complete ignorance of the existence of such things as microbes, some of them dangerous. Even if such people are theoretically aware that microbes do exist, they seem unshaken in their belief that no microbe could survive in *their* factory.

The future of food yeast

ANOTHER topic touched on by Mr. Bunker was the production of yeast for food, a subject which is becoming progressively more important, particularly in underdeveloped countries where good quality protein is in short supply. The speaker said that in this country its production is uneconomic at present, but there is one aspect of the subject which is likely to impinge on certain yeast users here some time in the future, and that is that with the growth of continuous fermentation in the brewing industry the amount of yeast produced as a by-product is likely to go down. This will hit the makers of yeast extract, for they will have to turn more and more to yeast factories for their supplies, which will cost a lot more when bought from these factories than from the brewers.

Another factor which will accelerate the decline in the amount of surplus brewers' yeast is the increasing production of lager beer, because with the bottom fermentation method employed in lager making less yeast is obtained.

There is undoubtedly a big future for food yeast, and its large scale production is now going ahead in several countries. The factory in Taiwan (described in our December, 1960, issue, p. 516) which produces forty tons per day is the largest single unit in the world.

Early experiments in Jamaica caused doubt to be thrown on the feasibility of producing yeast for food, but these experiments failed not because of the intrinsic unsoundness of the production methods but because of the unpleasant flavour imparted by the particular defoaming agent used. Satisfactory defoaming agents are now available, and Professor Kay, speaking at the Microbiology Group meeting referred to above, said that he had tasted yeast preparations which were quite neutral in flavour, and which would be quite acceptable when mixed with other foods in small amounts.

The problem of getting these products accepted on a large scale by communities who will certainly benefit from them is a psychological one which can be overcome, and efforts to do so should be put in hand

now, so that when these products become available they will be accepted more readily. To wait until the products become available before getting people used to the idea of eating them will cause a needless delay in the urgent business of adequately feeding undernourished people.

Opening the door wide to infection

ANOTHER example of how retailers frequently nullify the hygiene precautions taken by manufacturers was ventilated recently at a meeting of the Edmonton council. The public health department representative said that retailers were in the habit of cutting up large blocks of prepacked ice cream into smaller portions for sale to the public, thus destroying all the hygienic safeguards taken during manufacture and packing.

It is to be hoped that manufacturers will take note that this practice is going on and will take steps to discourage it.

How little we know about metabolic effects

MAN has lost the instinctive ability which animals have to choose his food according to requirements, but he has not at the same time acquired a full scientific knowledge to make up for this lack. This point was well brought out by Mr. T. McLachlan, chairman of the Food Group, in his Presidential Address, entitled "Diet as Preventive Medicine," to the Royal Society of Health Congress in Blackpool recently.

Indeed, Mr. McLachlan's theme was that we have hardly begun to understand the problems of diet, nutrition, and the metabolic effects of changes caused in food by processing. We have got to the stage where the rosy picture, built up in the first flush of scientific exuberance, is being dispelled by new knowledge which tells us that the picture is immensely more complex than we first thought; but as yet we have hardly even picked up the end of the thread which must somehow run through the whole. The more we know the more we realise we don't know.

An example of this very theme was our comment in these columns last month that the use of trace elements by the body is much more complex than was at first thought, and that excess of certain of these elements can be as harmful as a deficiency. Mr. McLachlan brought up this very point by saying that with minerals he believed that we are only on the threshold of knowledge regarding the effects of either deficiencies or excesses.

Among other topics referred to by the speaker about which information is desperately meagre are the effects on animal metabolism of saturation and isomerism during hydrogenation, the interdependence of body enzymes and hormones and vitamins and other foods, the phenomenon of allergy, and the formation of poisonous substances in common foods under certain conditions. An example of the last is the formation of solanine in potatoes on exposure to light, and of colocynthin in marrows and cucumbers, but fortunately Nature often provides a safeguard in that the affected parts of the plants generally become very bitter.

Soft drink competition getting tougher

EVERY year new records are set for soft drink production, and last year was no exception, sales being over £100 million in spite of the bad summer, a new record. Yet the fact that many companies, including some of the largest, experienced a severe fall in profits shows that competition in this tough field is getting keener.

Unilever's heavily advertised sachet drink, *Spree*, was a notable failure, showing that large advertising expenditure and the backing of a great name are not in themselves always sufficient to ensure success. Further severe price cutting has made the situation harder for the smaller firm.

Two ways to meet the situation, admittedly requiring much capital, have been adopted by some firms, further decentralising of bottling plants and the installation of newer and more economical equipment. The biggest expense is in distribution, and deliveries of concentrates in bulk to caterers will undoubtedly increase.

Royal fish

WE ARE indebted to Mac Fisheries for the following note about the halibut. No one knows who caught the first halibut which is the largest flat fish in the sea. But in 1066, four months before the Normans stormed Hastings, ailing King Edward the Confessor received a note from Pope Alexander II in which he mentioned the fish that was eaten by nobles on holy days—holy butt. Later it became known as halibut and for 680 years it was the traditional fish dish for kings. The largest halibut ever caught, weighing 680 lb., was landed on the Grand Banks off Newfoundland on Armistice Day, 1918.

Mallow A.F.D. Plant Opened

Exterior of the Irish Sugar Company's food processing factory at Mallow.
(FOODMANUFACTURE photo.)

Five tons a day processed in £250,000 factory

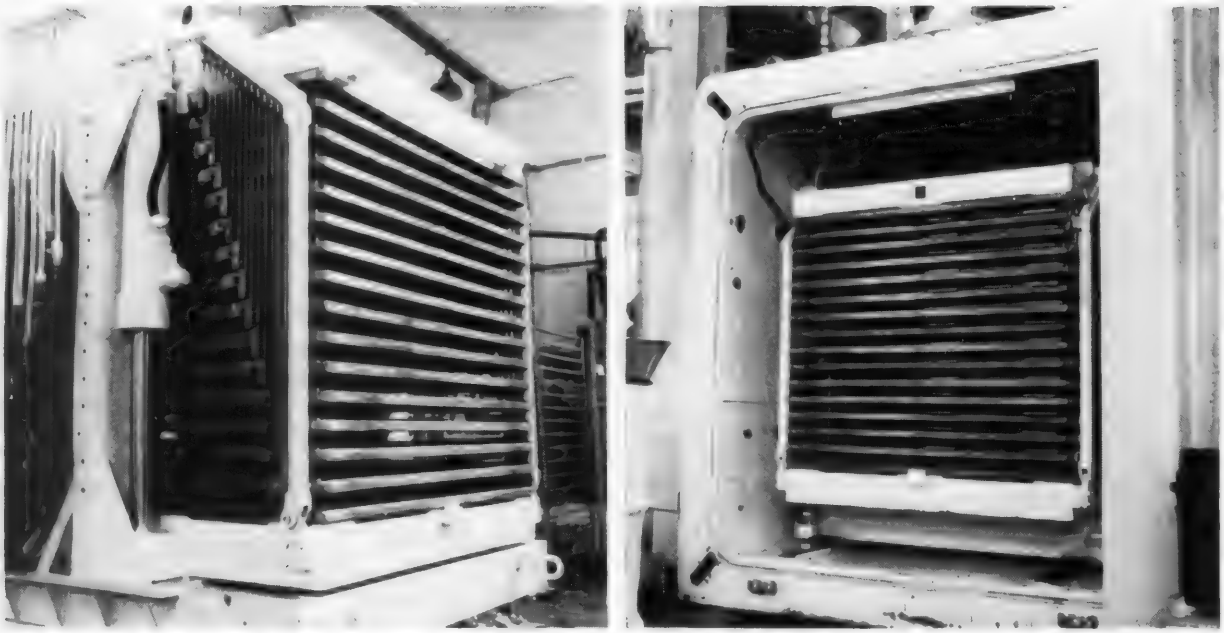
Opened on May 24 by Eire's Prime Minister, the Irish Sugar Co.'s A.F.D. pilot plant at Mallow, Co. Cork, is the first commercial plant in the world to use this revolutionary new drying process, developed at the Aberdeen Experimental Factory, for solid foods—meat, fish, fruit and vegetables. The plant, built by a British firm, with its building cost £250,000. Initial output is 5 tons a day of raw material, but large expansion is envisaged. FOOD MANUFACTURE'S *Editor attended the opening and gives here a first-hand report on the plant.*

THE official opening of the Irish Sugar Company's A.F.D. plant at Mallow by the Prime Minister of Eire, Mr. Sean Lemass, on May 24, marked the transition of this revolutionary food processing technique from the experimental to the commercial stage. The process, based on the sublimation property of ice, was developed by British scientists at the Aberdeen Experimental Factory of the Ministry of Agriculture, Fisheries and Food. The plant was built by a British firm, Vickers-Armstrongs (South Marston), Ltd., and although modest in capacity, is therefore a double achievement for British technology and a milestone in the history of food processing.

Why the company chose A.F.D.

To understand fully the reasons underlying the British Sugar Company's decision to take the plunge into a completely new method of food processing, the economics of which are largely unknown, some knowledge of the Irish economic set-up is necessary. Eire's population of less than 3 million, unlike those of other European countries, has been steadily declining for a century. The reasons for this are twofold, emigration and low fertility, both being largely due to economic causes. Eire's economy is basically agricultural,

(*Left*): **Part of the A.F.D. processing plant at the Mallow food processing factory of the Irish Sugar Company.** (*Right*): **Two of the drying cabinets and part of the steam ejector plant.**



(*Left*): **A close-up of the platens or contact heating plates of one of the cabinets, showing one of the four hydraulic pistons which open and close the platens.** (*Right*): **One of the drying cabinets showing platens.**

and its land is passed down from father to eldest son by a traditional system which has not changed for centuries.

The industrial revolution passed Ireland by. The famine of the early 1800's, the religious strife going back to the Reformation, and the political turbulence of the present century have clamped Ireland in a grip of frustration which has robbed her of her share of Europe's industrial prosperity. The result has been that large numbers of her people have sought their fortune in other parts of the world, while the economic life of Ireland herself has ebbed.

Farseeing Irishmen have realised that the remedy for the situation must come from a radical change of heart from within. The land, the basis of Irish wealth, must be made more abundant, not only to provide the Irish people with food but to give them the materials with which to take an increasing part in international trade. Thus the Irish Sugar Company, a Government-sponsored but self-supporting body, came about. In less than 20 years it has not only made Ireland self-sufficient in sugar but produces an exportable surplus.

Its interests are not confined to sugar. At Carlow it has a cannery and air-dehydration plant and a factory making agricultural machinery; at Ballybeg and Killough it has limestone quarries and cement works; at Gowla there is an animal food plant; while at Tuam there is a potato products plant, and a potato flake plant is due to be opened next year.

The whole emphasis of the company is to help Irish farmers through better use of their land, and to provide as much employment as possible for Irish workers.

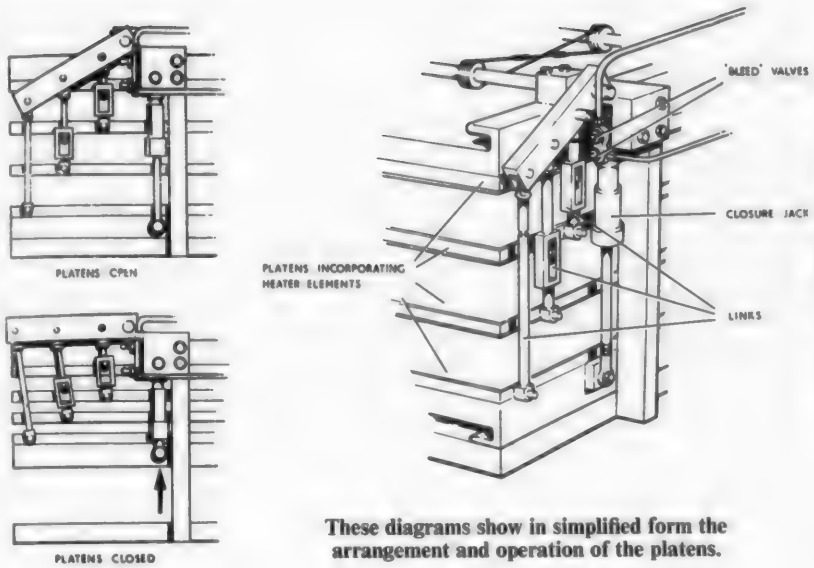
The directors of the company decided that the Aberdeen A.F.D. process provided a unique opportunity to carry the attainment of this object a stage further. As Mr. Sean Lemass said in his address, the undertaking is ideal for the conditions of the country. The surrounding countryside supplies all the essential raw materials. The produce going through the plant will be exported in a most valuable form, contributing to the better livelihood of the country's producers. Expansion of the plant's capacity will provide much-needed employment to the people of the district.

The process

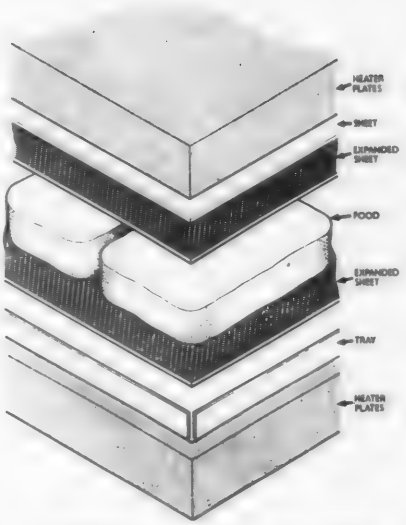
The essentials of the process and its development at Aberdeen have been described before in these pages (see especially FOOD MANUFACTURE, February, 1961, pp. 56-63) and it is not proposed to cover the same ground again here. Of all methods of dehydration, freeze-drying has the least effect on the flavour, structure, colour, nutritive value and appearance of the food. The products are light in weight (although volume is little altered), have indefinite shelf-life when properly packed, and can be transported and stored without refrigeration. The pieces of food are large and are instantly recognisable when reconstituted with water, a process which in some cases takes only a few seconds but never longer than a few minutes. Food can be pre-cooked before dehydration, making it possible to pack a complete meal of pre-cooked freeze-dried foods. (For a list of foods suitable for freeze-drying, see Table I.)

Products to be handled

The Mallow plant is intended to process peas, cauliflower, carrots, french beans, potatoes, brussels



These diagrams show in simplified form the arrangement and operation of the platens.



A diagram showing how the food is arranged between sheets of expanded metal and placed on trays between the platens.

sprouts, cabbage, strawberries, meat in the forms of steaks and mince from beef, pork and mutton, chicken and turkeys, and shellfish such as prawns, lobsters and scallops.

The plant's output is intended to be exported, under the brand name *Erin Foods*, mainly to England, Europe, U.S.A. and Canada. The first supplies will be sold in bulk containers (specially made steel drums), followed later by catering packs. The firm say that consumer packs should be on the market in about five months' time.

They also say that if all goes well with the expansion plans, its turnover in respect of all its products should be £50 million within the next ten years.

The plant

The plant comprises four drying cabinets and a multi-stage steam ejector system which removes the water vapour from the cabinets at the rate of about 100,000 cu. ft./min. at the designed pressure (vapour pressure of ice at −20°C., the operating temperature, is about 0·8 mm. of mercury). The presence of air in the cabinet hinders the flow of water vapour, and the cabinet must therefore be evacuated to a partial air pressure of less than 1 mm. of mercury; it is therefore essential that the cabinet be as air-tight as possible.

Each cabinet has a tray area of about 350 sq. ft., carrying about 900 lb. of food. With a cycle time of 8 hours and three cycles per day from each cabinet, the daily weight of raw material that can be processed is therefore about 5 tons.

At present the food is frozen *in situ* after being loaded into the cabinets. This is accomplished by removal of latent heat of evaporation during evacuation and no refrigerant is used. We were told that this works satisfactorily for most foods, and that freezing to −20°C. is rapidly achieved.

After evacuation, hot water is pumped through each stack of parallel heating plates, of which each cabinet has 16. The food is loaded on trays which are inserted between the heating plates by means of wheeled stillages.

The heating plates are linked in a manner which allows them to be moved together so that close thermal contact is made evenly with both upper and lower surfaces of the food. Plate movement is

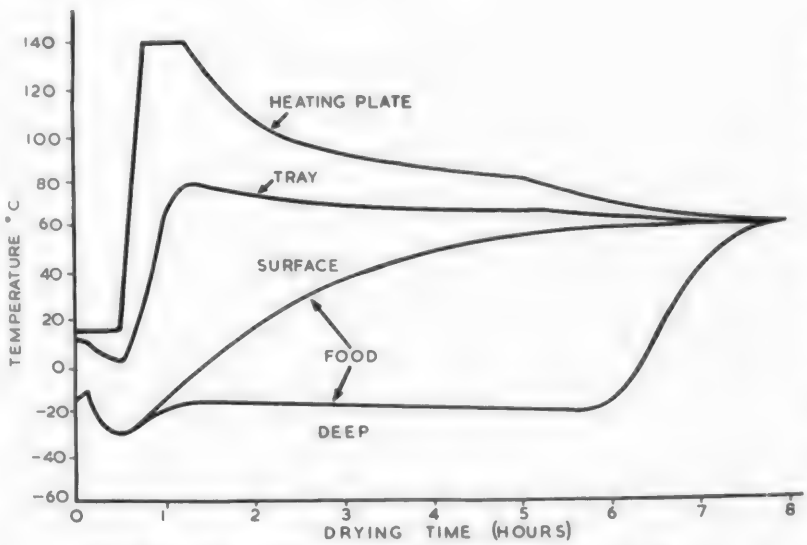


Diagram showing the temperature changes during a typical drying cycle.

Table I. Foods Suitable for Accelerated Freeze-Drying

(1) Animal and Fish Products

Beef	—Raw steaks, raw minced, sliced cooked, raw cubes.
Chicken	—Cooked flaked.
Pork	—Raw steaks, raw chops, minced cooked, chunks cooked.
Veal	—Minced cooked.
Ham	—Minced cooked.
Egg	—Raw—yolk and white beaten together. Raw—yolk and white separated.
Cod	—Raw steaks with bone, or boneless; flaked cooked.
Halibut	—Raw steaks.
Salmon	—Raw steaks.
Herring Roe	—Raw.
Scampi	—Raw; poached.

(2) Vegetables

Potatoes	—Scalded, chipped, sliced.
Carrots	—Scalded, sliced, diced, stripped.
Cabbage	—Scalded, shredded.
Peas	—Scalded.
Beans—broad	—Scalded.
Beans—green	—Scalded, crosscut.
Cauliflower	—Scalded.
Beetroot	—Cooked, sliced.
Asparagus	—Scalded.
Onions	—Raw, sliced.
Leeks	—Raw, chopped.
Mushrooms	—Raw.
Mixed Vegetables	—Raw.

(3) Fruit

Apples	—Raw, diced or sliced.
Apricots	—Raw, halved.
Bananas	—Raw, sliced.
Blackcurrants	—Raw, abraded after pre-freezing.
Greengages	—Raw, halved.
Plums	—Raw, halved.
Raspberries	—Raw, whole.
Strawberries	—Raw, husked and halved.
Fruit Juices	—Pre-frozen slabs.
Fruit Pulps	—Pre-frozen slabs.

(4) Cooked Dishes

Meat and Vegetable Stew Spaghetti and Tomato Sauce Sago Pudding Rice Pudding	All frozen and cut into slabs before drying.

actuated by four hydraulic jacks which can apply mechanical pressure to the food surfaces up to a maximum of 8 lb. per sq. in. of food surface.

The heating plates are hollow, and each contains two labyrinthed counterflow circuits through which is pumped hot water heated by a steam-operated heat exchanger which can raise the water temperature rapidly to a maximum of 140°C.

The drying cycle

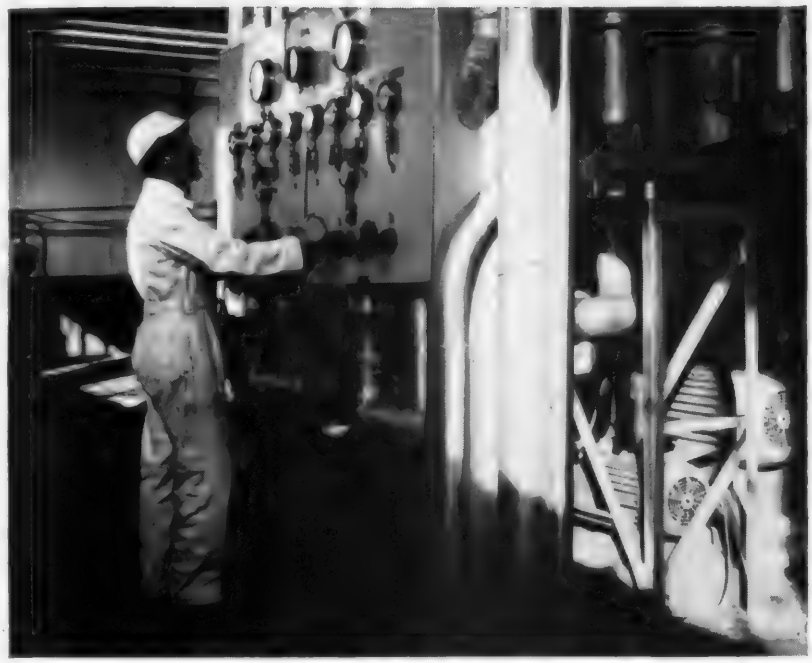
Each layer of frozen food in the form of slices of constant thickness is sandwiched between sheets of expanded metal mesh which are inserted between both tray and lid and the food surfaces. The configuration of the expanded metal is such that even when mechanical pressure is applied to the food, there is an adequate path through the mesh to allow the escape of vapour.

The application of pressure ensures sufficient heat transfer from the heating plates to the food. Since the corners of the mesh are slightly pointed some degree of penetration into the food is obtained, increasing the thermal contact and shortening the heat path to the ice surface in the food. The amount of plate pressure applied during drying depends on the load-bearing properties of the food; soft foods require light pressure, whilst fish and beef steaks can withstand much higher pressures.

A typical drying cycle is as follows: The food is spread on trays in even layers about $\frac{5}{8}$ in. thick, using expanded metal inserts. The trays are loaded into the special stillage which is then wheeled to the loading position.

The trayloads of food are loaded into the cabinet with the heating plates in the open position. The cabinet doors are closed and evacuation commenced. The initial rapid evacuation of air from the cabinet is effected by high capacity booster ejectors which reduce the absolute pressure in the system to 20 mm. Hg. in about 3 min. The primary and secondary augmentors are then brought into operation to reduce the absolute

This picture shows the stillages by means of which the drying cabinets are loaded. After being dried the food is unloaded on to similar stillages at the rear of the cabinets. (FOOD MANUFACTURE photo.)



An operator at one of the control panels of the vacuum system.

pressure in the cabinet to below 1 mm. Hg.

The whole pump-down operation takes about 5 min. to complete. The boosters are shut off and the "leakage" air load is subsequently handled by low capacity maintaining ejectors.

When the cabinet is evacuated to a total pressure less than the vapour pressure of the ice in the food, sublimation begins, and the food temperatures fall rapidly to a minimum of about −30°C. The heating plates are then closed into light contact with the food and heating steam is applied to raise the temperature of the plates from about 15°C. to 140°C. in 15 min. The steam supply is reduced to hold the plates at this temperature for about 30 min. and is then shut off.

Subsequent natural cooling of the circulating water causes the temperature of the plates to fall comparatively slowly. The cooling rate is adjusted if required by applying small quantities of heating steam throughout the rest of the cycle so that, at the end of drying, the temperature of the plates has fallen to 60°C. This cooling procedure is followed and final plate temperature selected in order to avoid heat damage to the dry food surfaces as the sublimation rate falls.

The temperature of the food surfaces is not allowed to rise above 60°C. throughout the process. If necessary, the heating plates can be cooled rapidly by means of a cooling heat exchanger or by injecting cold water directly into the heating circuit.

During drying the plates are gradually brought into closer thermal contact with the food by increasing the plate pressure by increments up to a maximum suited to the particular food being dried; it is maintained at this level until drying is complete. The completion of drying is indicated when the food temperatures rise to the same temperature as the heating plates.

Food temperatures are measured by means of thin flexible thermocouples inserted in the food before it is frozen. The total drying time depends on the type of food and its thickness, but an average figure is eight hours.

When drying is complete the cabinet is isolated from the vacuum system and the latter is shut off. The cabinet vacuum is then broken by admitting dry nitrogen, the doors are removed and the trays of dry food are unloaded into a stillage.

COMMENTS

It is obvious that market requirements are not going to be satisfied with a plant processing only 5 tons a day of raw material, and this plant must therefore be regarded as a pilot plant. The plant was not working during our visit, and as it has been in working order only since Easter, very little freeze-dried food can as yet have been produced.

Packaging

No details were given as to the precise method of packaging the product.

No signs of a packing line was seen, nor indeed any plant for prefreezing the food before putting it into the cabinets. A number of new vegetable preparing machines were on view, but these did not seem to be in their final positions.

Regarding the actual freezing of the food before drying, this is at present being done in the cabinets by removal of the latent heat of evaporation of the moisture in the food during the initial evacuation; no refrigerant is used in the contact plates, and rate of evacuation is sufficiently rapid, it is claimed, to quick-freeze the material to −20°C., the operating temperature, without damaging the structure of the food. This probably works well enough for a wide variety of foods, but we would have thought that for meat, for example, initial freezing in a blast freezer before it is loaded into the cabinets would be preferable. The company have not disclosed whether or not they intend to instal a blast freezer. Undoubtedly such a decision will depend on the results of experiments in the months to come.

Summing up, we have the impression that the plant is in its very early days and that the company's forecast that consumer packs will be on the market in a few months is rather optimistic. We nevertheless hope that this courageous and historic venture meets with the success it deserves.

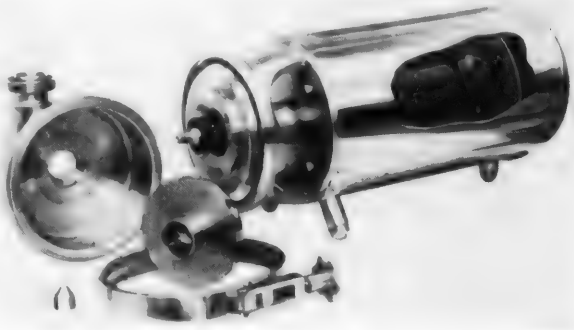
PUMPS and Pumping Equipment

What pump to use for which job and where to get it is the theme of this quick survey

THE *Puma* range of centrifugal type stainless steel pumps made by the **A.P.V. Co.** are designed to meet the exacting requirements of the beverage industry. An essential feature of their design is ease and completeness of dismantling for cleaning and maintenance. Only two parts, the pump body and impeller, need to be removed, and this is facilitated by a quick-release clamp ring. A stainless steel stub shaft attachment permits the use of a wide variety of standard type flange-mounted motors, enabling speedy replacement in the event of motor breakdown.

Seal interchangeability is another feature. Normally supplied with Crane No. 6D rotary carbon seals, alternative and easily changed seals can be provided to meet specific duties. All *Puma* pumps can be equipped for water cooling of the seal area regardless of seal type.

The range is based on three standard pump sizes—1½, 2 and 2½ in., with alternative sized suction connections to cover duties extending from zero flow at a maximum pressure of 114 p.s.i. to 16,000 g.p.h. at 20 p.s.i. Motors normally supplied are either 220/380 v. or 400/440 v., 3 phrase, 50 cycles, and all pumps employing motors up to 5 h.p. are fully shrouded. Above 5 h.p., pumps are unshrouded and carried by the motor which is mounted on its own base instead of being supported on a cradle secured to the extension frame.

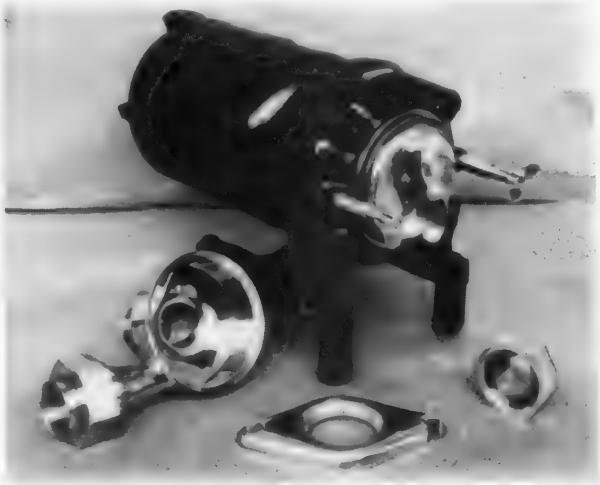


An A. P. V. "Puma" pump showing ease of dismantling.

Ebonite pumps made by Silvertown Rubber Co., a subsidiary of **B.T.R. Industries, Ltd.,** have long life, shown by the fact that a vinegar pump installed by the company at Worcester in 1866 was taken out of service only five years ago. Another feature of Ebonite is its resistance to corrosion, which makes it an excellent material for the linings of pumps, vessels and pipelines which handle corrosive liquids.

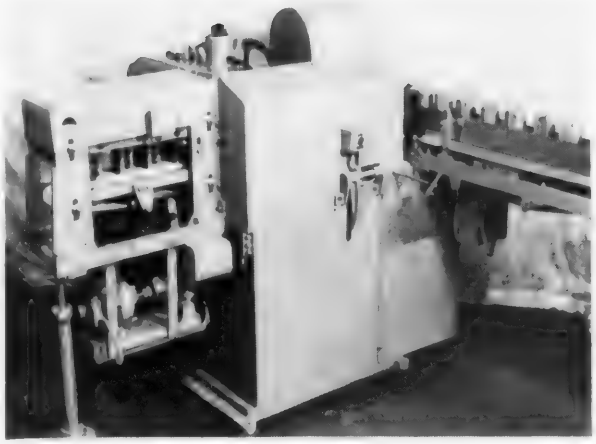
The company can supply pumps of any capacity likely to be called for in ordinary factory practice. "Bucket" and "plunger" types can be designed to work by hand or power, and in the latter case the makers will supply drawings of suitable driving gear.

Ebonite-lined centrifugal pumps made by the same company are designed for corrosive acid or alkaline liquids, all metal parts in contact with liquids being covered with best quality Ebonite. Four sizes are at present in production, ¾, 1¼, 2 and 3 in., with outputs varying from 100 to 14,400 g.p.h. depending on h.p. at shaft and on the lift. Direct drive or belt driven pumps can be supplied.



A C.P. centrifugal pump Mk. II shown dismantled.

The C.P. Centrifugal Pump Mark II manufactured by **C.P. Equipment, Ltd.,** has now been further improved by standardising



"Speedivac" RB4 pump fitted to automatic bag closing and labelling machine for tea packaging.

an impeller screwed to the spindle nose. Two wing nuts hold the pump case in position and the easy-clean features are retained. All product contact surfaces are of highly polished FMB grade stainless steel and Flexibox seals can be fitted when specially required.

This pump is available with $\frac{1}{4}$ h.p. slow speed or $\frac{1}{2}$ h.p. high speed motors, and the quality of the stainless steel components makes them suitable for fruit juices and sugar syrup. When handling water the $\frac{1}{4}$ h.p. pump has an approximate capacity of 1,500 g.p.h. at 2 ft. head ranging to 100 g.p.h. at 9 ft. head, and the $\frac{1}{2}$ h.p. pump 3,000 g.p.h. at 10 ft. head ranging to 100 g.h.p. at 34 ft. head.

The company are also concessionaires for the R.E.C. range of Easy Clean Positive Rotary Action Pumps which are manufactured by Stainless Steel Pumps, Ltd. Exclusive features include splined shafts where rotors are fitted; standard type O ring joint between rotor case and back plate. R.E.C. pumps are suitable for suction lift and can run on snore or completely dry for several minutes without damage, and are particularly suitable for sticky and sensitive liquids. The pumps are manufactured in a range of five sizes for capacities from 50 to 10,000 g.h.p., for pressures up to 120 p.s.i.; glands are of the normal packed stuffing box type, but Flexibox or Crane mechanical gland seals can be fitted if preferred. The makers say that the greatest possible attention has been paid throughout to cleanliness, easy dismantling and reassembly, and complete freedom from bacteria contamination in the pump head.

A range of heavy pressure pumps, suitable for dealing with plastic fats, greases, fuel oils, glucose, syrup, malt, condensed milk and any similar product where high delivery pressure may be involved, is made by William Douglas and Sons (Engineering), Ltd., a subsidiary of **Baker Perkins, Ltd.**

Three sizes are manufactured: EH $1\frac{1}{4}$ in., $1\frac{1}{2}$ in., and 2 in. The pumps run at slow speeds and on the products mentioned there is little or no slip. In consequence, they can be used as precise measuring pumps giving an exact discharge under a timed run.

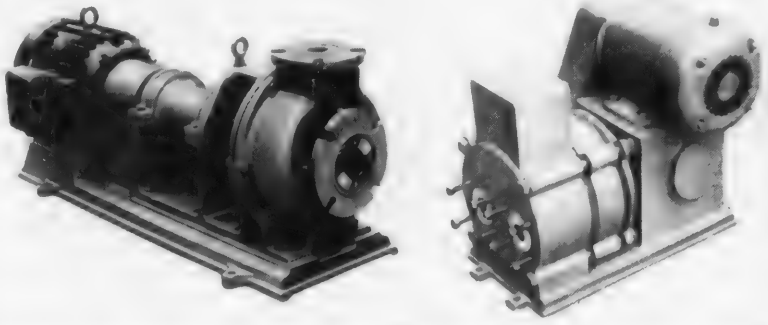
All models are fitted with seals, but where these cannot be satisfactorily employed a suitable packed gland is arranged.

The base of the pump encloses a chamber which is suitable for either warm water or steam so as to keep the pump warm when on particular duties.

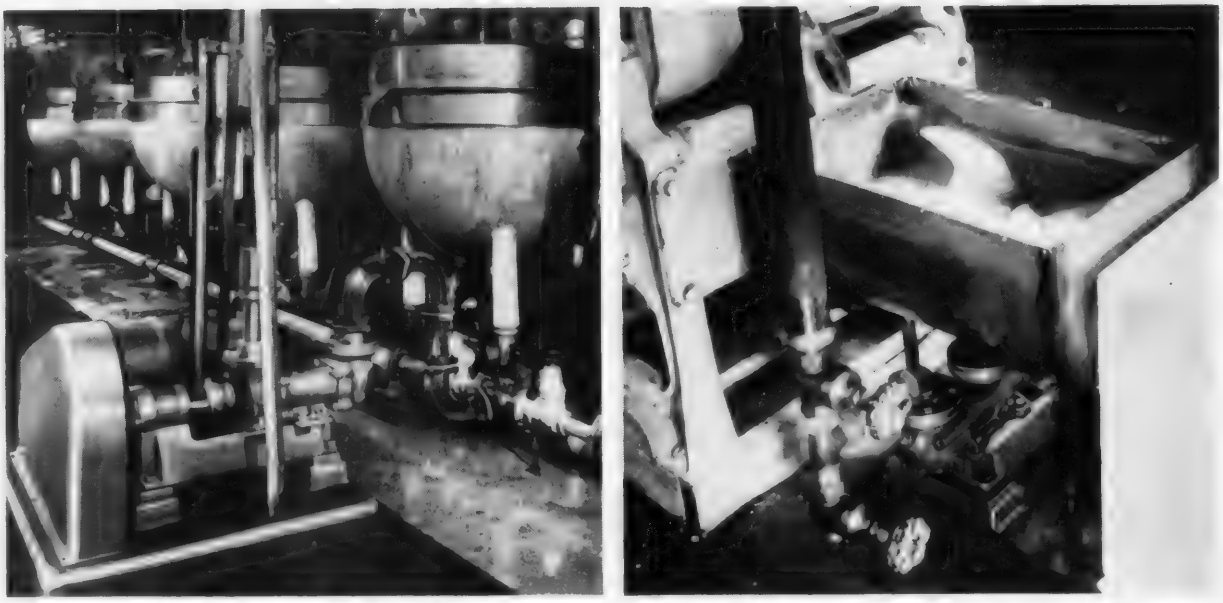
The relevant displacements are 670, 1,330 and 1,870 gallons per hour.

The recent interest in accelerated freeze drying has focused attention on the increasing importance of vacuum processing to the food industry. The successful development of vacuum packaging methods relies on the availability of robust, high performance vacuum pumps. *Speedivac* pumps manufactured by **Edwards High Vacuum, Ltd.,** feature in a wide range of packaging machinery from automatic bag closing and labelling units for tea packets to high output units for packing cheese, bacon and processed meats.

The *Speedivac* range of pumps divides conveniently into two important groups: the RB series of compressor vacuum pumps with free air displacements up to 5 ft.^{3}/min. and vacua between 20 and 26 in. Hg. column, which are suitable for vacuum holding and general packing duties, and the oil sealed rotary vacuum pumps with displacements up to 100 ft.^{3}/min. capable of achieving vacua better than 29·98 in. Hg. column. The latter pumps will become even more important as the require-



Mitchell Craig pumps. (*Left*): **Ceramic lined centrifugal pump.** (*Right*): **Motor driven diaphragm pump.**



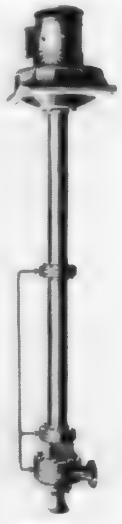
Mono pumps. (*Left*): **A stainless steel SH60 Mono pump used for delivering hot vegetable stock to a canning machine. Normal pump speeds are 300 to 450 r.p.m. for capacities between 360 and 480 g.p.h.** (*Right*): **Viscous biscuit cream being handled by the stainless steel rotor stator H30 Mono pump. Speed 200 r.p.m. Intermittent feed at rate of approx. 1 ton hr.**

ments for the removal of water vapour and oxygen from vacuum packs become more stringent with the commercial development and marketing of A.F.D. foods. This type of pump is already incorporated in the pilot freeze drying units manufactured by the company.

The design of the new Mitchell Craig ceramic lined pumps made by **L. A. Mitchell, Ltd.,** incorporate many improvements which have evolved in many years of experience in the supply of ceramic lined pumps. The pump suction and delivery pipework is accommodated on the main pump body and the design is such that the complete impeller and bearing assembly can be withdrawn for maintenance without breaking the main suction and delivery connections. The pump can be supplied with either a standard type of packed gland or mechanical seal for which special provision has been made in the design.

For pumping clear liquors the pumps are available with an internally flushed seal designed to dissipate heat from the stationary seat to avoid overheating and in the case of light slurries or crystal bearing liquors, the seal can be supplied with an external flushing arrangement to exclude solid matter from the seal faces. The pumps are fitted as standard with open type impellers so that they are equally suitable for pumping clear liquors or slurries.

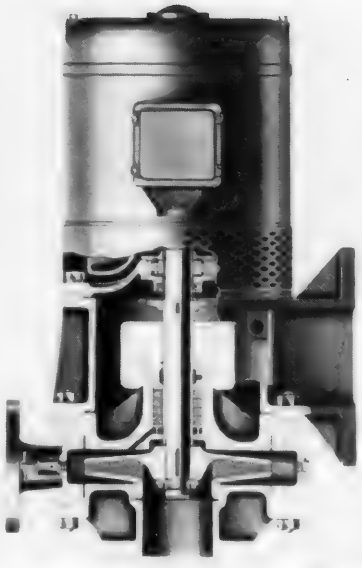
The series A ceramic-lined centrifugal pumps of this type are available with packed glands or mechanical seals, direct coupled or belt driven, in capacities up to 400 g.p.m. and heads to 120 ft. There are two ceramic-lined diaphragm pumps, hand-operated portable and motor driven. The former has a capacity of 300-350 g.p.h. and the latter a capacity of 500 g.p.h.



A Saunders trunk pump with ground-level motor and immersed pump, for pumping out of wells and similar duties, with one-piece or multi-section shafting to suit the depth of pit. Can be conveniently arranged for float operation.

The Mono Pump, made by **Mono Pumps, Ltd.,** simply consists of a single metal rotor rolling in a fixed stator of non-contaminating composition, and is a positive rotary pump, inherently self-priming and capable of high suction lifts up to 25 ft. Once the pump has been efficiently installed, it can be operated and maintained by unskilled labour. The liquid being pumped provides sufficient lubrication for the pumping element. It can be easily dismantled for cleaning, or alternatively, a flushing device can be fitted on pumps using belt drive.

The range of Mono Pumps for food duties extends to capacities up to 7,500 g.p.h. Pumps are available for delivery heads up to 300 ft. of water or for pressures up to 130 lb. p.s.i.



A "Safran" self-contained electric pump showing "Unishaft" drive, robust bulkhead mounting permitting installations in limited space and restricted footing. Suitable for mounting in any position provided that in vertical position the motor is uppermost.

For duties associated with enrobing machines handling sugar and chocolate fondants the compact and lightweight construction allows easy installation. Delivery from the pump is uniform under varying heads or pressures and therefore a constant flow to the enrobing machine ensures an unbroken curtain of fondant during operation. The pump can be operated at low speeds without impairing its efficiency. The temperature of the fondant shows no appreciable increase during its passage through the pump.

The low fluid velocity through the pump provides distinct advantages when handling thick creams used for biscuit filling. Suitable speeds can be chosen to conform with the viscosity rating of the cream. Where biscuit manufacturers have used the Mono Pump for handling marshmallow an even consistency has been achieved. When fluidity will allow, the self-priming ability and high suction power of the Mono Pump permits suction over the side of a tank, thus eliminating the need to cut expensive stainless steel vessels for pipe entry.

In the wide range of *Safran* pumps made by the **Saunders Valve Co., Ltd.,** there are types to meet the great variety of duties peculiar to the food industry, including pumping both materials in process and the finished product. Amongst pumps for various manufacturing purposes are those for boiler-feed duties, bottle cleaning machinery and remote-from-power services at dairy farms and fishery stations. For each there are such types as self-contained, multi-stage, trunk, sump and deep-well and portable units with engine-driven power.

These pumps are available with metal specifications to suit the fluid, and variations in impeller design enable them to be adapted to suit the viscosity and solid-bearing nature of the fluid foods involved.

The simple, accessible and robust build of the *Unishaft Electric* pump commends itself for food manufacturing work as will be seen from the illustration. One shaft for pump and motor reduces overall length and at the same time dispenses with a mid-shaft pedestal and bearing. Motor and pump are spigoted to opposite faces of the bulkhead bracket, thus ensuring constant alignment and vibration-free running. The bulkhead, rigidly braced, provides the most compact mounting bracket and requires a minimum of footing for installation.

Safran Unishaft pumps are available in 9 sizes from ¾ in./¾ in. to 5 in./6 in. for duties up to 900 g.p.m. Identical pumps can be supplied as direct coupled units complete with bedplates and as bare shaft pumps for building-in to plant and for driving by belt, gear or any convenient means.

▶ The Association of British Manufacturers of Agricultural Chemicals have produced a booklet which brings up-to-date the provisions of the Pharmacy and Poisons Act, 1933, and the Poison Rules, 1960, relating to the sales of insecticides, fungicides, weedkillers and rodenticides. The booklet replaces the chart formerly issued by the Association, and may be obtained from the offices of the Association, Cecil Chambers, 86, Strand, London, W.C.2, price 3s.

Technical Press Review

Corrosion of Cans

Some New Ideas on the Mechanism of Corrosion of Tinplate Cans by Fruit are put forward by Dr. Dickinson in this month's **Corrosion Technology.** An article on the Preservation of Water-sealed Gasholders by Protective Painting is also included.

A simple Guide to Boolean Algebra is given in **Automation Progress** which also outlines a New Approach to Drilling Problems.

Laboratories and Pilot Plants are featured in **Chemical and Process Engineering.** Silver is considered as a Material of Construction for Chemical Plant.

Dairy Engineering explains What it Means to Change to Cartons and describes Aseptic Filling into Paper Containers. Also reviewed are American Trends in Milk Cartoning.

Will Bulked Acrylics claim another Victory over Wool? asks **Fibres and Plastics.** Production Methods for Textryls are also given.

A special feature on Floors for the Chemical Industry appears in **Manufacturing Chemist,** and in the series, The Scent of Flowers and Leaves, the Goosefoot family is discussed.

Reviews of The Paint Industries of some Commonwealth Countries form the subject of **Paint Manufacture.**

An account of Natural Gas in the Sahara is given in the July issue of **Petroleum,** which also considers the Status of Geochemical Prospecting.

A report of the Water Supply in Great Britain is given in **Public Works and Muck Shifter** and details of a suspension bridge carrying conveyor belts for the transport of materials are included.

Seychelles Cinnamon is examined in **World Crops,** which deals mainly with cultivation and harvesting machinery.

Specimen copies of these journals can be obtained by writing to the Circulation Manager, 9, Eden Street, London, N.W.1.

Insect Pests in Food Stores

The following article, recently published as a Ministry of Agriculture, Fisheries and Food Advisory Leaflet, is reproduced by permission of the Controller of H.M.S.O. It describes the common insect pests and methods of preventing and eliminating them by common-sense precautions, by proper packaging and by the use of fumigants and insecticides.

IN these days of transparent wrappers and food hygiene regulations, the consumer quite rightly demands a high standard both in the quality and the cleanliness of his food. In spite of this, food contaminated by insects and mites still finds its way on to the market and is the subject of many court proceedings every year.

Insect pests will, given the chance, attack our food and contaminate it with their bodies, webbing or excreta. Food may pick up these pests anywhere along the line from the producer to the consumer. Infestations which persist in some of our wholesale and retail buildings are known to be responsible for at least part of the contaminated food which is sold. It is therefore the duty of everyone who manufactures, stores or trades in food to ensure that their buildings and stock are free from insect infestation. Failure to do this can lead to complaints and/or damage to goodwill with consequent loss of trade, or even to prosecution.

There are two Acts of Parliament which have a direct bearing on this problem, the Food and Drugs Act, 1955, and the Prevention of Damage by Pests Act, 1949.

The Food and Drugs Act, 1955, is enforced by the public health authorities. Under it, anyone may be prosecuted who is responsible for the sale or the distribution for sale for human consumption of unsound food, or the sale, to the prejudice of the purchaser, of food which is not of the nature, substance or quality demanded. The Food Hygiene Regulations, 1955, require walls, doors, windows, ceilings and all parts of the structure of food premises to be kept clean and in such good order, repair and condition as to prevent, so far as is reasonably practicable, any risk of infestation.

A stack which has become badly "webbed" by the larvæ of the warehouse moth, Ephestia elutella.

It is, however, far better to combat infestation before the public has had any cause for complaint, and this is the primary aim of the Prevention of Damage by Pests Act, 1949. This Act requires that all occurrences of insect and mite infestation in food or food wrappings, in storage buildings, or transport vehicles, must, subject to certain exceptions, be reported to the Ministry of Agriculture, Fisheries and Food, or, in Scotland, to the Department of Agriculture and Fisheries. Both the Ministry and the Department have experts stationed at Regional Offices who can give advice on the control measures to be adopted.

COMMON INSECT PESTS

Considering the amount of damage which pests can do and the importance of their control, it is most necessary that those responsible for handling and storing food should know as much about them as possible. The identification of insects is a job for experts, but the warehouseman and shopkeeper should know something about at least a few of the insects which they may come across in the course of their work.

1. Warehouse Moth

The warehouse moth (*Ephestia elutella*) is one of our most common pests. Small and greyish in colour, the adult moths may be seen during the months May-September flying around near the ceiling, resting inconspicuously or settling on the food to lay their eggs.

The damage is done by the grubs which grow to nearly an inch in length and are creamy white in colour. Migration occurs when the grubs come to the surface of the food and begin to move

away from it towards the building structure. Fine strands of silk webbing are spun as they go, and if the infestation is a heavy one, these strands may become matted into a dense sheet which covers the surface of the commodity. The grubs then crawl up the nearby walls or stanchions and enter small cracks and crevices where they spin cocoons and remain throughout the winter in a resting stage or "diapause." They reach the chrysalis stage the following spring and the new adults begin to emerge in May.

The grubs attack a wide variety of food, including chocolate, raw cocoa beans, cereals, cereal products, dried fruit, spices and nuts. Most nuts in shells are safe from attack unless the shells are damaged, but the grubs are able to bore their way between the half-shells of walnuts and so reach the kernel inside.

The life cycle of this moth is very well adapted to storage conditions. For a large part of the year the infestation remains hidden in the building structure and a complete turn over of stock during this period will have little or no effect on the numbers of larvae present. In this way, the infestation is maintained from one year to the next and new stock becomes infested as soon as the adult moths emerge in the early summer.

2. Mill Moth

The mill moth (*Anagasta kuhniella*) is similar in appearance to the warehouse moth although slightly larger. The grubs do not migrate away from the food when they are fully grown but remain in it to overwinter and form chrysalises. They attack flour and other cereal products and flourish in accumulations of flour dust where they can live. The mill moth can be a serious pest in flour mills, where machinery and spouts may become choked up with masses of webbing, flour and larvae. From infested machinery and during storage the mill warehouse insects (grubs, moths and eggs) can get into retail packets of flour and so on to the consumer.

3. Australian Spider Beetle

There are several species of spider beetles in this country of which the Australian spider beetle (*Ptinus tectus*) is by far the most common. They are small round beetles bearing a superficial resemblance to small spiders although, on close examination, they can be distinguished as having six legs instead of the spider's eight. Originally a Tasmanian species, *Ptinus tectus* has now spread to almost all temperate regions of the world and it is present in a great many of our storage and domestic buildings.

Spider beetles are nocturnal insects and, because of this, a heavy infestation may not be at all obvious during the daytime when most of the beetles are concealed in cracks, dark corners or between bags. One or two beetles seen crawling around during the daytime can mean that many hundreds more are actually present, waiting until night before emerging to lay their eggs on suitable food. They are a particular problem in some of our older buildings where the structure provides plenty of cracks and places in which they can hide.

Spider beetle grubs will feed on almost any food substances and they will also do damage by gnawing small holes in sacks, paper wrappings and cardboard. Because of their habit of concealing themselves, they will often congregate between bags or boxes and, if damage is suspected, it may be found by moving the packages away from each other and looking between them.

4. Biscuit Beetle

The biscuit beetle (*Stegobium paniceum*) can do considerable damage to sacking and to paper and cardboard wrappings, and the grubs have even been reported as being able to penetrate tin foil. When it hatches from the egg the tiny grub is very active and can crawl round the folds of packeted foods and so reach the contents.

This small, dark, active beetle is very common in domestic premises and shops, where it will attack a variety of cereal products including flour, biscuits and breakfast cereal as well as some spices. Occasionally, spectacular infestations have been produced in single left-over packets of breakfast cereals or spice or a forgotten piece of bread.

5. Food Mites

Many people believe that mites are small insects but, in fact, they have eight legs and are more closely related to spiders than to insects. They are very small ani-

An example of damage caused by the biscuit beetle, Stegobium paniceum.

mals, about 1/50th in. long. Individually, they are not very readily seen but a heavy infestation appears as a conspicuous greyish or brownish dust around the bags or boxes of food. They require a fairly high humidity and flourish in damp, ill-ventilated rooms and cellars or in food which has a fairly high moisture content.

There are many species of mites which infest food but the most common are flour-mite (*Acarus siro*), dried fruit mite (*Carpoglyphus lactis*) and house mite (*Glyciphagus domesticus*).

PREVENTIVE MEASURES

Dark, ill-ventilated rooms, cracks and crevices, spillage, food residues and old, undisturbed stock—these are the conditions in which insects and mites will thrive.

Importance of hygiene

Wherever food is stored or handled, hygiene is of primary importance. Good hygiene means more than sweeping away obvious spillage and dust; it means a careful and frequent cleaning in inaccessible corners, in cracks, behind stacks—anywhere, in fact, where food residues may gather and where infestation may develop. Cleaning which has to be "fitted in" between other jobs can never be satisfactory, and it is important that there should be sufficient staff to concentrate on this work and that good equipment should be provided.

All goods should be examined before being brought into the store and any having obvious infestation should be rejected.

The quality of stacking is also of great importance. In some stores the tendency is towards overcrowding, with different consignments piled against each other and against the walls. Under these conditions, cleaning can never be satisfactory since it is impossible to clear away spillage from behind the stacks. Cross-infestation, from one commodity to another, may also occur and one infested consignment could affect many more before the trouble is noticed. Goods should, therefore, be piled separately, away from the walls, allowing sufficient room for inspection and cleaning between and behind the stacks.

A heavy infestation of mites. Where the mites have spread on to the floor, they are visible as a fine dust.

Strict rotation vital

Above all things it is important to use stock in strict rotation, and goods should be clearly marked with date of storage and should never remain in store for longer than is necessary.

Mites, in particular, thrive under high moisture conditions and though dampness by itself will not cause a mite infestation, once they have been introduced, it will enormously increase their chance of survival and breeding.

It is important, therefore, that the building structure should be sound and the storage rooms dry. Sawdust and sacking which has been used to soak up moisture is an excellent habitat for mites. Dripping taps, broken windows, or leaking roofs should be repaired at once, to maintain dry storage conditions.

Because of their small size, inconspicuous appearance, and rapid rate of multiplication a quite heavy mite infestation may develop before it is noticed. By that time the mites may have spread a considerable distance away from their original source, so when dealing with a mite infestation it is wise to treat a far wider area than may first seem necessary. It should also be remembered that mites are very easily spread on brushes and brooms, and these should be treated with insecticide immediately after they have come into contact with mite-infested dust.

Problems in old buildings

Unfortunately, the structure of many old storage buildings is far from ideal. Most of them are very difficult to clean as there are innumerable places in which residues may collect and insects can hide. Rough walls, cracks, ledges and badly fitting floor boards are faults which cannot be easily or cheaply rectified but, wherever possible, structural improvements should be made. It is worth mentioning here that panelling over walls and ceiling joists may give the place a tidy appearance but it only adds to the problem by providing more and bigger spaces for residues and insects. Unsightly as they may be, it is far better to leave walls and beams exposed so that they can at least be cleaned and inspected.

PACKAGING

Infestation may, of course, originate from the factory but in a large proportion of cases it is

An ideal breeding ground for infestation.

known to have been picked up after the food has left the manufacturer. The manufacturer can, to a certain extent, guard against this by making his packets and boxes as nearly insect-proof as possible.

No pack is insect-proof

A complete insect-proof package which can be economically produced is, unfortunately, a thing of the future. Such a package would have to be made of a completely insect-resistant material, sealed in such a way as to eliminate all crevices through which insects might pass. Experiments have shown that some of the tough plastic films which are being developed are, in fact, insect-proof but, for the present, they are expensive to produce and of little practical use to the food manufacturer.

The manufacturer has, therefore, to make use of materials which are not completely resistant, but he should use these materials in such a way as to provide the maximum possible protection against insect pests. Generally speaking, the tougher, thicker materials are more satisfactory than thinner ones—aluminium foil paper laminate is fairly resistant, although some insect larvae will gnaw their way through, and strong cardboard will also give fairly good protection provided it is carefully sealed.

At the other end of the scale, paper, polythene sheet and transparent wrapping are inadequate and quickly gnawed through by insects. A shiny, smooth surface is better than a rough one, since insects cannot so easily get a purchase on it. Once insects have gnawed their way through an outer wrapper, they are able to brace themselves against it and so penetrate an inner liner more easily. If two layers of packing are used, the tougher, more resistant material should therefore be used on the outside.

A recent development is the impregnation of packaging materials with insecticides. Although still in an experimental stage, these impregnated materials will, no doubt, be used commercially in the future.

Importance of proper sealing

The construction and proper sealing of the package is as important as the choice of the material. Many insects, particularly in the grub stage, are extremely small and can squeeze through minute cracks, where joins are not properly sealed down or where bad cutting has left small gaps at the corners of cartons or boxes. It is no use choosing a strong resistant material if insects can gain entry through these faults.

For distribution and wholesale storage, the individual packets are usually enclosed in a master pack which, if it is well constructed of strong material, should be a fairly good protection. In the retail shop, however, the master pack is opened and the individual packets are exposed, often for long periods, in the store room, on shelves or in display windows. The manufacturer must always bear this in mind when the design of both individual packets and master packs are considered.

USE OF INSECTICIDES

The insecticides which are used against storage pests fall into two groups—fumigants and "contact insecticides."

Fumigation strictly means the use of poison gases, and these should be used only by properly qualified people. Large firms may operate their own fumigation chambers, but generally speaking the method is unsuitable for use in small premises and, if contemplated at all, a fumigation company should be employed to do the work.

Contact insecticides

Most commonly used in storage or domestic buildings are contact insecticides. Because insects have to come into actual bodily contact with them if they are to be effective, these insecticides will only kill those insects which are on the surface of the stacks or exposed on the building structure. They will have no effect on the ones which remain inside the food or deep in cracks. Even a layer of dust is enough to protect insects which lie underneath. It is therefore important to do a thorough cleaning, exposing as many insects as possible, before a treatment is carried out.

Contact insecticides may be applied to surfaces in the form of liquid sprays, dusting powders, smoke generators, or (in the case of gamma-BHC), mixed with whiting powders prior to whitewashing.

Many people refer to the use of smoke generators as "fumigation," but this is incorrect since the smoke consists of fine particles which settle as a dust mainly on horizontal surfaces. The particles will not penetrate into bags or cracks, nor is it likely that a sufficient deposit will be left on vertical surfaces to affect most larvae and many crawling insects.

Provided goods are taken into storage in an uninfested condition they are likely to be kept clean and free from insects by practising good hygiene coupled with the routine use of a contact insecticide as a surface film on the fabric of the storage and supporting dunnage. Where it is common practice to whitewash walls, gamma-BHC (lindane quality) may be mixed with the whiting before application. This is the only insecticide that is effective with whitewash. It may not be mixed with limewash, as the free alkali in the material rapidly breaks it down to substances non-toxic to insects.

Alternatively, and more commonly, insecticides may be sprayed on walls by one of the many sprayers available on the market. Where sprayed surfaces are of an absorbent nature (e.g., untreated brick or wood), the use of a water dispersible powder preparation of BHC, DDT, or malathion is recommended. On drying, the active material remains on the surface available to invading insects. With miscible or emulsion concentrates, on the other hand, much of the chemical may be absorbed into the fabric. Pyrethrum preparations may also be suitable under certain conditions; these may have other contact insecticides mixed with them, and are also available in the form of press-button aerosols suitable for use in small retail premises.

Need for experts

The choice of the right insecticide depends on the species of insects, the type of food in stock, and whether the insects are on this food or in the building structure. It may be seen, therefore, that it is very important to call in an expert as soon as possible.

Not only are some insecticides more effective against one species of insect than another but some foods are more liable to taint than others.

Shopkeepers and wholesalers should ask the local Public Health Department for advice; large firms may go directly to the Regional Pests Officers at the Regional or Port Offices of the Ministry of Agriculture, Fisheries and Food, or the Department of Agriculture and Fisheries for Scotland.

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Mechanised Cheesemaking in Commercial Use

By J. Czulak, N. H. Freeman and A. L. Hammond*

The first commercial model of the automatic cheese curd milling, salting and hooping machine developed in Australia by the dairy research section of the Commonwealth Scientific and Industrial Research Organisation has been in operation in a large cheese factory since April 1960. *This article describes the machine, its operation and performance.*

FOLLOWING the successful commercial factory trials of the prototype automatic curd milling, salting and hooping machine developed by Czulak, Freeman and Chapman,[1] the first commercial model of this plant was constructed by James Bell Machinery Pty., Ltd., of Melbourne, in co-operation with the dairy research section of C.S.I.R.O. The machine was installed in April, 1960, in a large cheese factory in Victoria, where it has since undergone extensive trials under intentionally varied production conditions. Data from these tests and from normal production runs permit a comprehensive assessment of the performance of this equipment to be made.

* Dairy research section, Commonwealth Scientific and Industrial Research Organisation.

The plant

Illustrated in Fig. 1, the commercial model differs in many respects from the prototype, the main modification being a new type of salt apportioning apparatus (Patents applied for) with a totally enclosed weighing mechanism, which replaces the salt vibrator used in the prototype. With the exception of some parts *not* likely to come in contact with either curd or water, the plant is made of stainless steel. The electrical wiring is carried inside the tubular members of the frame.

The plant is made up of the following units:

1. a mechanically driven, variable-speed curd mill;

2. a hydraulically driven curd vibrator;

3. an elevating, belt-type, curd conveyor;

4. a salt apportioning device, comprising a weighing conveyor, suspended on a balance beam connected by means of electronic controls to a variable-speed electric motor,

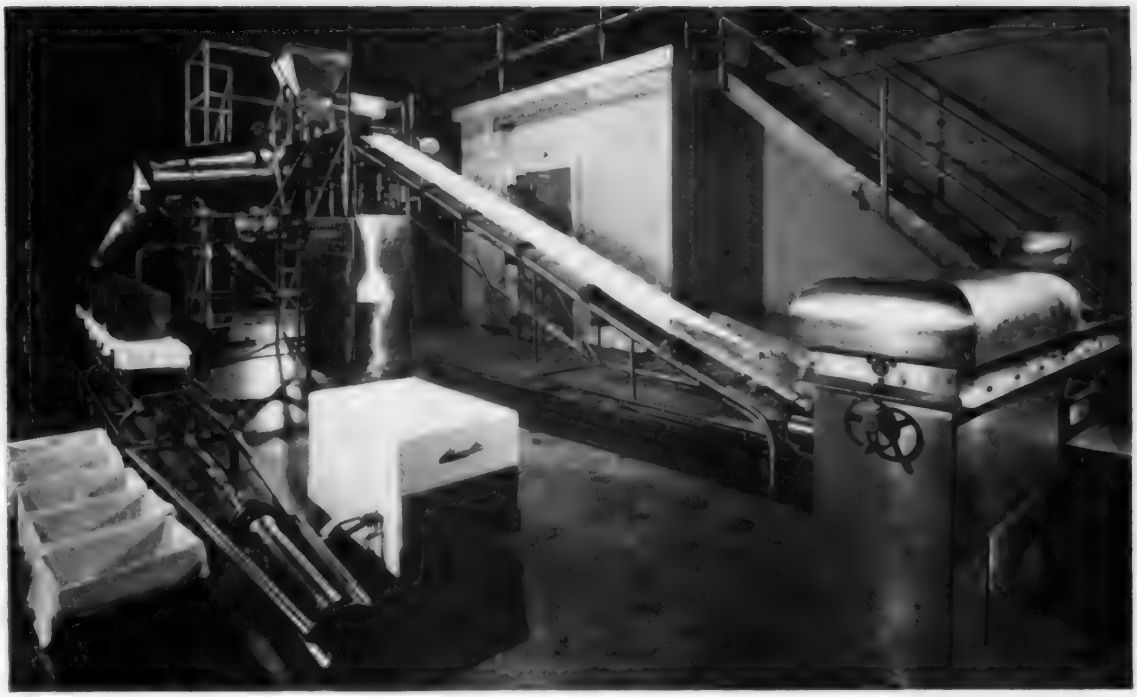


Fig. 1. An overall view of the automatic milling, salting and hooping machine. It can be coupled with a cheddaring machine or used as an independent unit.

which drives a salt metering wheel in the outlet of a salt hopper;

5. a mixing drum with a solenoid operated gate, shown in Fig. 2;

6. a hoop conveyor assembly, comprising a pushrod-and-pawl type conveyor, scales fitted with a proximity switch (Patents applied for), and a receiving stage, also shown in Fig. 2.

Operation

Cheddared curd is fed into the mill, the speed of which can be varied to suit the throughput required. The milled curd is spread evenly by the vibrator on to the elevating conveyor, from which it falls on to the weighing conveyor, illustrated in Fig. 3. The weight of the curd carried by this conveyor causes a proportional displacement of the balance beam. This movement is converted into an electrical signal by the *Selsyn* transmitter, which governs the speed of the electronically controlled variable-speed motor driving the salt metering wheel. The amount of salt delivered is for practical purposes proportional to the speed of the metering wheel and to the amount of the curd carried by the weighing conveyor. The rate of salting can be readily varied by reference to a tachometer and a potentiometer control as shown in Fig. 4.

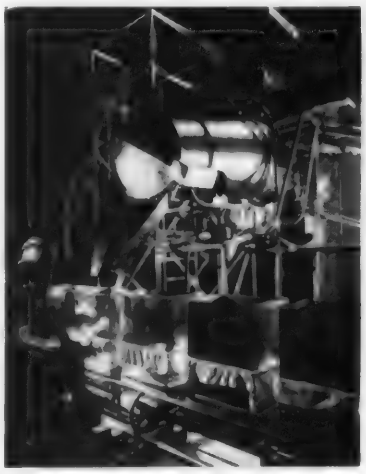


Fig. 2. The mixing drum and hoop conveyor assembly. A proximity switch in the scales causes the drum to stop and its gate to close when a predetermined amount of curd has been delivered.

The curd and the salt are fed into the mixing drum simultaneously. After thorough mixing, the salted curd is discharged into a hoop on the scales. When the predetermined quantity of curd has been delivered to the hoop, the proximity switch in the scales causes the mixing drum to stop and its gate to close. After a short pre-set delay, the filled hoop is moved away and an empty hoop is placed on the scales by the pushrod-and-pawl conveyor. Filling is then resumed.

Performance

Throughput: The machine mills, salts, and hoops automatically and with satisfactory accuracy, up to 8,000 lb. of curd/hr., which is equivalent to the output of eight 1,000 gal. capacity vats. This means that the curd from a 1,000 gal. vat can be milled, salted and hooped within 7 min.

Salting accuracy: Statistical analysis of data from experimental and normal production batches, hand and machine salted, shows the following variation in salt distribution in terms of standard deviation (SD):

Salt distribution	Hand salted SD	Machine salted SD
Within one cheese	0·042%	0·064%
Between cheeses from same batch ...	0·048%	0·066%
Between vats or batches	0·094%	0·070%

Thus, although the variation in salt distribution within one cheese and between cheeses from the same batch is greater in machine-salted cheese, the variation between vats or batches and, therefore, the overall variation, is much smaller than in hand-salted cheese. This is due to the fact that in machine salting the salt is apportioned to the actual weight of the curd, while in hand salting it is added according to an estimated yield of the curd in each vat.

In practice, in the machine-salted cheese the variation in salt distribution within one cheese, between cheeses, and between batches, would very rarely exceed the value of ±0·15%. For example, with an average salt content of 1·80%, the lowest value would be 1·65%, and the highest 1·95%.

Fig. 3. Curd on the weighing conveyor. The weight of the curd governs the amount of salt delivered by the salt apportioning device.

Salt retention: The machine-salted curd is hooped within 20 sec. of the addition of salt. If the curd were pressed immediately, a relatively greater amount of salt, as yet unabsorbed, would be expressed with the whey than in hand-salted and hooped curd, which has a much longer time to absorb the salt before pressing. For this reason the machine-filled hoops are allowed to stand for at least 30 min., and preferably 1 hr., before pressing.

Type of salt: Free-flowing salt is required for accurate metering by the machine. The following three types of salt gave satisfactory results:

1. normal cheese salt with 0·5% of hydrated sodium aliminosilicate (*Zeolex* 23) as a moisture binding additive;
2. pure vacuum-dried salt (I.C.I) with grain size of 0·20 to 0·40 mm. without additive;
3. normal cheese salt without additive, but sieved as follows: all particles passed through 25 B.S.S. mesh; 40% was retained on 36 B.S.S. mesh; 58% was retained on 72 B.S.S. mesh; 2% passed through 72 B.S.S. mesh; density—68 lb./cu. ft.

Because of the different densities per cubic foot the machine should be calibrated separately for each type of salt.

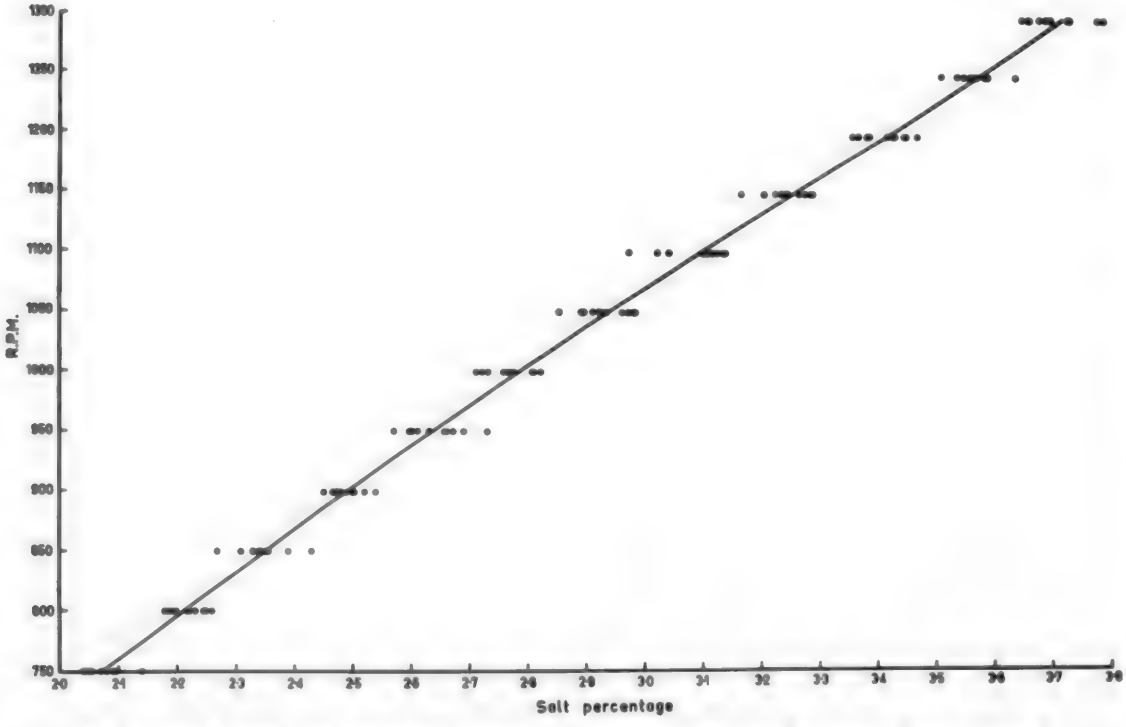


Fig. 4. Graph showing the relationship between tachometer readings and the amount of salt delivered.

Reduced fat losses: Fat and casein determinations on the whey, after salting and pressing, gave the following results (average of six vats):

Content in whey	Hand salted	Machine salted
Fat	7·70%	1·70%
Casein	2·20%	1·69%

The greatly reduced fat and casein losses in the whey indicate that the curd receives much less damage in machine salting than in hand salting. Because of the reduction of up to 75%, in the fat losses at this stage, the machine-salted and hooped cheese would contain, on the average, 1% more fat.

Labour saving

The machine eliminates a large part of the heavy manual work involved in Cheddar cheesemaking. It can be used with the traditional or with the short-time methods of cheese manufacture and can be coupled with a cheddaring machine or used as an independent unit. In the latter case, the curd is cheddared manually in the vat and then taken by an additional conveyor, or by a trolley, to the mill.

When coupled with a cheddaring machine it requires two men to operate it—one to feed the hoops, the other to stack them on the presses.

With curd that is cheddared in the vat, an additional man is required to feed the curd to the mill.

If operated with a cheddaring machine, the automatic curd milling, salting, and hooping plant alone would save the labour equivalent to two manhours for each 1,000 gal. vat.

With a conveyor feeding the curd from the vat to the mill, the saving of labour would amount to 1½ manhours for each 1,000 gal. vat.

Cleaning

The entire plant can be cleaned daily after the completion of manufacture by one man in not longer than 1 hr.

The several thousand tons of cheese made with the machine so far has showed no difference from handmade cheese in any characteristics or in grade.

Acknowledgment

The authors wish to thank Dr. K. Farrer, chief chemist, Mr. R. Gilbert, factory manager, and the factory staff of Kraft Foods, Ltd., Allansford, Victoria, for co-operation in analytical and experimental work.

REFERENCE

1. J. Czulak, N. H. Freeman and H. L. Chapman. *Aust. J. Dairy Tech.*, 1958, **13** (1), 18.

Correspondence

Mr. Marples's two spits

SIR,

May I, very "reverently," reply to your editorial in the May issue, that in fact all the prominent and well-known personalities who are members of our Guild have not only once roasted with a turning spit but are doing so regularly, since they happen to be enthusiastic amateur cooks, who have small turning spits in their kitchens.

This is not at all so surprising as you may think since more and more men in recent years have taken up cooking as a hobby and do, in fact, very often get in their wives' way in the kitchen, particularly at weekends. Mrs. Sherek tells me that when Henry is in the kitchen there is just not enough room for her because of his circumference; he weighs twenty-two stone. As for Mrs. Marples, she is not allowed in the kitchen at all, since our Minister of Transport does all the shopping and cooking himself. Mr. Marples possesses, in fact, two spits, one gas fired and one electric one. So may we please ask you to stop your "irreverence."

R. CHARLES LIEBMAN,
Chancellor, British Chapter,
Chaine des Rotisseurs,
London, E.C.4.

Colour in Factories

COLOUR in industry is not merely a form of decoration or even a "welfare" measure. It has certain functions to perform and the factors that are important for practical success have been established.

The latest report in the Factory Building Studies series,* based on several years' work on the use of colour in various types of building, is a concise guide for factory managements and their architects or colour consultants. It has two sections, both containing coloured illustrations. The first section describes the basic properties and effects of colours, linking them with certain facts about human eye-sight, to form general principles for colour design.

The second section explains the practical application of these principles, starting with a description of British Standard 2660 ("Colours for building and decorative paints"). It indicates stage by stage the way in which colours for each element of the interior become disciplined so that a picture is formed of the characteristics essential to good factory colouring. The examples are mainly for daylight, but there are notes on the special problems arising where lighting is partly or wholly artificial.

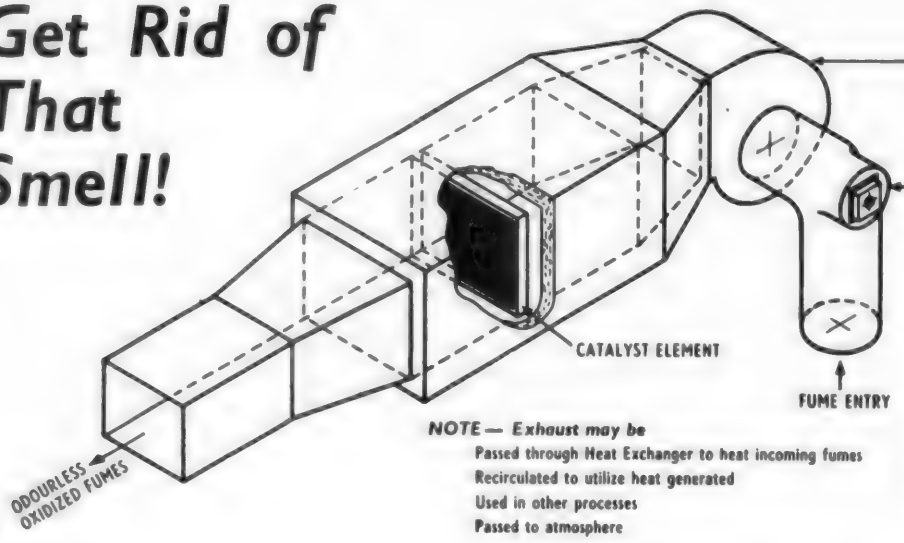
As lighting and colouring are inter-related, this Study is complementary to the earlier Study (No. 2 in the series) on "The Lighting of Factories."

* Factory Building Studies No. 8. "Colouring in Factories," published for D.S.I.R. by H.M.S.O. Price 7s. 6d. ($1.35 U.S.A.), by post 7s. 10d.

* Factory Building Studies No. 2. "The Lighting of Factories," published for D.S.I.R. by H.M.S.O. Price 3s. 6d. (63 cents U.S.A.).

▶A booklet describing their *Poly-V* drives has been issued by Turner Brothers Asbestos Co., Ltd. The booklet provides some detailed engineering data, together with lists of horsepower ratings and information about servicing, installation and maintenance.

Get Rid of That Smell!


CIRCULATING FAN NOT NECESSARY IF THERE IS GOOD STACK DRAFT
BURNER TO HEAT FUMES WHEN BELOW 450° to 500°F
CATALYST ELEMENT
FUME ENTRY
ODOURLESS OXIDIZED FUMES
NOTE — Exhaust may be
Passed through Heat Exchanger to heat incoming fumes
Recirculated to utilize heat generated
Used in other processes
Passed to atmosphere

The basic principle of the Holmes-Catco catalytic combustion system. The usual type and concentration of dust particles normally present in the atmosphere have no clogging effects on the catalyst, but large amounts must be removed before treatment.

By Peter W. Sherwood

If your plant smells the public will take a poor view, however good your products are. Eliminating smells at source not only promotes good public relations but can also be a sound economic investment.

MOST odours emitted by food processing plants are not physiologically harmful. Instead, their nuisance value is generally psychological and involves relations between the processing plant and its surrounding community. As such, the odour problem is dealt with as part of the broader picture of air pollution control with all of its implications of public relations and local restrictions.

This aspect is particularly important to the food industry in the light of much evidence that public interest in the industrial odour problem is definitely on the increase. Despite the many contributors to odour, especially in municipal areas, a large segment of the public tends to single out food plants as major offenders.

Some food processing operations lend themselves to elimination of odour at the source. However, here each problem is a specific one and cannot be considered in a general discussion.

Chemical treatment rarely feasible

In other cases, it is possible to eliminate, or at least to reduce the extent of objectionable odour by converting the responsible compounds to a more innocuous form. Such conversion is affected by chemical conversion (oxidation, neutralization, hydrolysis, polymerization, etc.). This approach is rarely feasible, however, in the case of the complex odour-causing mixtures which abound in food plants and which, in many cases, defy chemical analysis.

Dispersion into the atmosphere may be adequate if meteorologic and aerodynamic conditions surrounding the plant site are favourable. Where a problem exists in this respect, improvement is possible in many cases by raising the stack height or the temperature and flow of the issuing waste gas.

Such atmospheric dispersion or odours by use of high stacks frequently reduces the problem but rarely solves it completely. The main limitation is the dependence of such methods on the highly variable direction and magnitude of air flow.

Objectionable odours are conveyed to the atmosphere on solid and liquid particles, as well as in gaseous form. Particulate components may be removed from the plant's effluent gases by filters, cyclones, electrostatic precipitators, etc., all of which are well-established tools in air-cleaning technique.

A different approach must be taken for the removal of odours which are emanated in gaseous form, and it is found that the majority of industrial odour problems are in this category.

Catalytic combustion

Where the serious odour problem persists, industrially practicable methods of control may take any of the following four main forms: catalytic combustion of the odorous compound, removal by absorption or adsorption, and masking or counteracting of the odour by means of reodorants. All these are suitable for food plants.

Combustion is feasible for destroying many types of odour-causing organic materials as well as hydrogen sulphide. To be effective, as a method of odour control, the oxidation must be complete and its reaction products must be innocuous (i.e., carbon dioxide, water, nitrogen, and sulphur dioxide which, though irritating, is much less objectionable than are many other sulphur compounds). Incomplete combustion may be worse than none at all for it superimposes irritating oxidation products, such as sulphur dioxide and nitrogen oxides on top of the remaining odour problem.

To achieve the required completeness of oxidation without recourse to very high temperatures, catalytic converters are employed. Here, the industrial waste is mixed with air and passed over a catalyst consisting of platinum or a platinum alloy on a porous carrier such as activated alumina. Operation of the unit is in the range of 650-1250°F.

Key to the economic operation of a catalytic oxidation unit is the amount of combustible gas which is present in the waste stream. With a combustibles content of 15-20% of its lower explosive limit, it is usually possible to run the combustion unit without external fuel except during start-up. At 5% of the lower explosive limit, or below this point, such a high firing temperature is usually called for that this type of operation is no longer economical. On the other hand, very high concentrations of combustible components in the waste gas will result in the evolution of sufficient heat in the course of oxidation to permit recovery of waste heat which sometimes pays for the operation of the odour-removing combustion step.

As pointed out above, catalytic oxidation is not always the answer to odour removal and even where use of this method is indicated, it must be checked by pilot-plant operation to ensure reliability (i.e., completeness) of deodorization, and to establish the operating problems and costs.

Absorption and adsorption

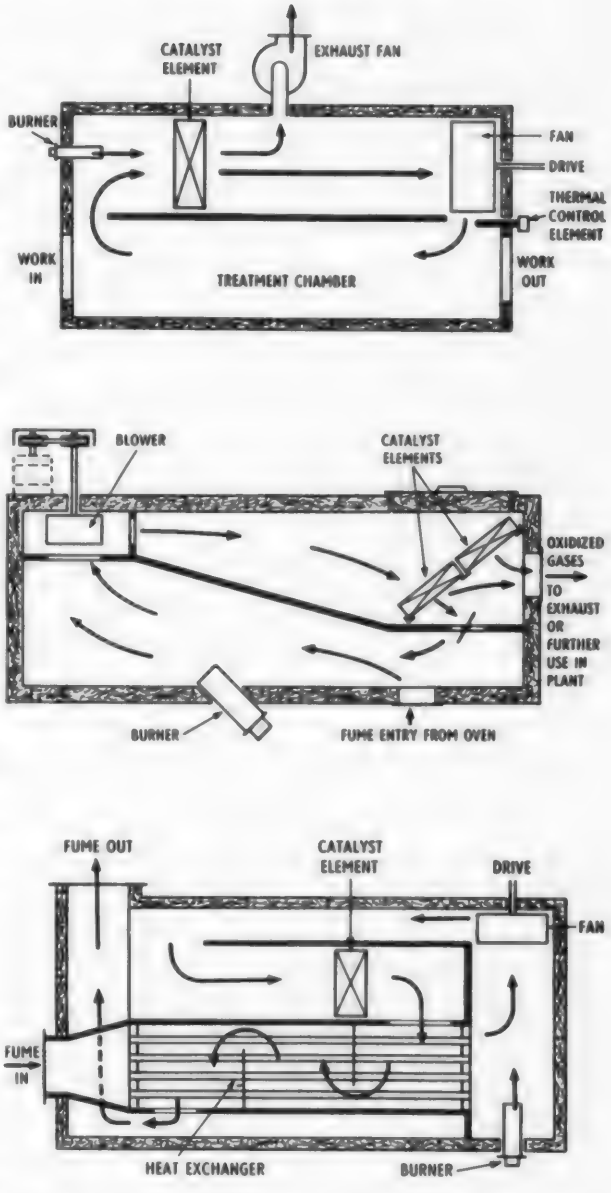
A second commonly employed method for odour removal involves absorption. This is a possible approach whenever the odour component can be dissolved or emulsified in a low-cost liquid. Here, any one of a number of commercially common types of scrubbing equipment may be used. However, use of absorptive methods frequently introduces a problem in river pollution by the absorber's liquid effluent stream.

Absorption on activated charcoal is frequently an effective answer to odour problems. The method is highly effective for the removal of a wide range of odorous components. However, the economic range for adsorption deodorization is limited to an initial odorant concentration between 2 and 5 p.p.m. This compares with a normal practical operating range between 1,000 and 1,500 p.p.m. in catalytic oxidation methods.

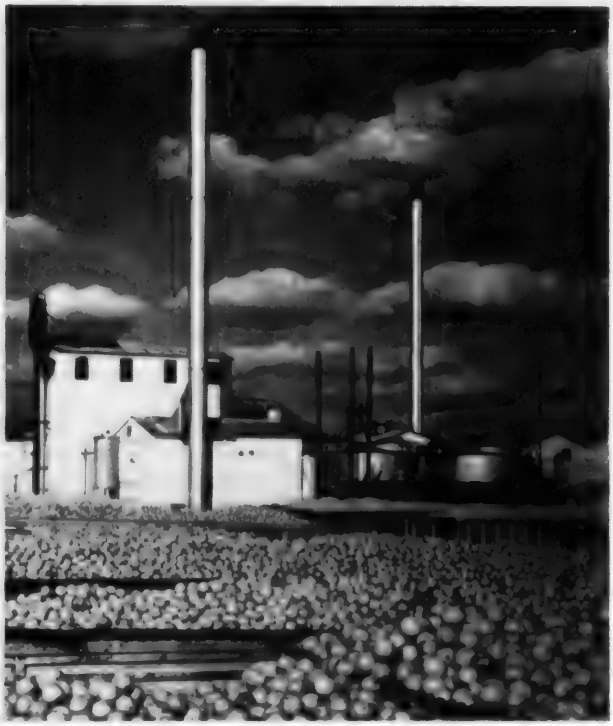
As an extension of adsorptive deodorization, a method has recently been developed for treating acti-

(*Concluded on page 298*)

Three types of Deodorising Plant



Three main types of Holmes-Catco plant are supplied, depending on the temperature of the fumes entering the process and the concentration of the contaminants. The top drawing shows a section through a baking or similar chamber where fume temperature is above the minimum catalytic combustion temperature; some of the hot oxidised gases are used to preheat the scavenging air. The centre drawing shows a plant where the inlet fumes are below the catalytic combustion temperature but where the contaminant concentration is of the order of 20% of the concentration at the lower limit of flammability. The bottom drawing shows a plant for treating fumes below the catalytic combustion temperature and where the concentration of the contaminants is so low that the recirculation system shown in the centre drawing cannot be used, the fumes being pre-heated in a heat exchanger by the hot oxidised gases, and further heated if necessary by a burner.



(*Left*): **An evaporator with a capacity of 36,000 lb. hr. of evaporated water.** (*Right*): **Trucks full of oranges waiting to be unloaded at the Citrusville cannery.**

Modern Methods in Florida Fruit Cannery

The Citrusville plant of the Florida Citrus Canners Co-Operative is one of the largest in Florida's expanding citrus juice processing industry. The author of this short article has recently returned from a visit to the plant.

NINE citrus growers' associations, bringing together 1,300 fruit farmers, form the Florida Citrus Canners Co-operative, whose brand name *Donald Duck* can be found on the frozen orange, tangerine and grapefruit concentrates, pasteurised canned juices, grapefruit sections and citrus salad, which are all produced at the Citrusville plant on the outskirts of Lake Wales in Florida. This plant is one of the largest in the state.

Juice processing

The fruit to be used in concentrates is unloaded into storage bins at the plant or direct into hoppers and graded, any damaged fruit being removed. Then it is borne on a moving belt, where it is washed by jets of hot water, to the juice extraction machine, which crushes the juice and separates the pulp. The pulp is pressed for citrus oil whose uses include the manufacture of perfume and for addition to animal food.

The juice is piped through strainers to vats where its acid content and sweetness are adjusted to a standard degree. The juice is then heated to 190°F., canned, sealed and conveyed to a cooling plant for rapid cooling. A conveyor belt takes the cans to the labelling department and then on for bulk packing.

Every twenty minutes, samples are taken off the line and tested by U.S. Department of Agriculture inspectors who are permanently in the factory. The whole operation, from the time the fresh fruit arrives at the factory to the time it is packed in its case, takes ten minutes.

There is storage space at the plant to take between 1½ and 2 million cases of fruit.

Mechanical peeling

In the plant for canning grapefruit sections, the fruit, after being graded and washed and the peel softened by an alkaline bath, passes to a mechanical peeler, which has replaced hand labour in the last two years.

The fruit is automatically placed in a holder and eight "C" shaped knives cut the peel into sections,

Aerial view of typical Florida citrus groves. The famous lakes, of which there are more than 30,000 in the state, are a source of irrigation for the groves and some protection in the few cold winter nights; they also provide fishing and boating amenities for the tourist.

which is pulled away by mechanical fingers.

The sections of the fruit itself are still cut by hand, but experiments are being made with a machine which will separate the fruit as well as the peel. This piece of machinery, entirely automatic, is so delicate that the cutters will only operate against the edible portion of the fruit; as soon as they come in contact with the pulp, they move fractionally to left or right before the cutting action is permitted to proceed.

Enzyme inactivation by steam injection

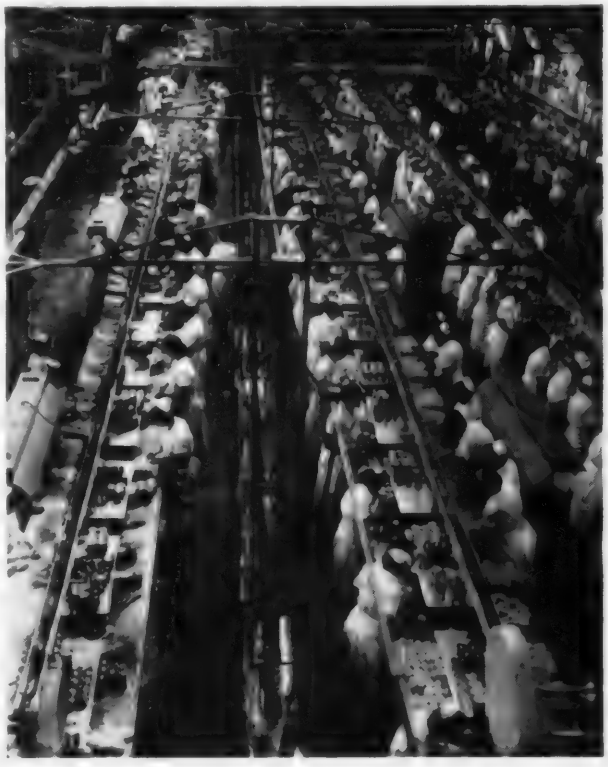
Citrusville was one of the first Florida plants to use a steam injection method of inactivation method instead of plate-type heaters to achieve greater stability. It is claimed that concentrates processed in this way have greater stability than other concentrates. The highest temperature used in this process is 160°F., which is lower than that used with other inactivation methods.

Four years ago a new test for oranges for concentrate was developed. Previously the blending of concentrate had been on a brix-acid basis, the relationship between fruit sugar and acidity, which indicated the degree of sweetness of the juice. The co-operative research started testing orange juice for *p*H and found that fruit with an abnormally low *p*H often had a harsh taste, even if the brix-acid ratio was satisfactory; this study led to a better understanding of the process which takes place during the manufacture of fruit products. The *p*H depends not only upon the citric acid concentration but upon mineral and nitrogenous compounds in the juice.

Frozen citrus concentrate

The frozen citrus concentrate plant at Citrusville is claimed to be the first plant in the state designed and built for the exclusive packing of this product. It has the largest evaporator in the industry, built and installed by E. J. Kelly and Associates, and capable of evaporating up to 36,000 lb. of water per hour from orange juice. Other evaporators in this plant, built by Mojonnier Bros., bring the total evaporating capacity to over 56,000 lb./hr.

The installations at Citrusville, comprising the frozen concentrate plant, the sectionising plant, the juice plant and the pulp and molasses plant, can handle 75,000 boxes of fruit a day, equivalent to 150 railway wagons. They are valued at $7 million.—J. I. N. C. SAUNDERS.



In this department women workers are cutting and canning grapefruit sections. The workers are usually paid on a piecework basis.

ADVANCES in FOOD TECHNOLOGY

CANNING

New method of heat processing

Rotation at 120 r.p.m. and carrying the cans through gas flames are the features of a new continuous steriliser that enables high-temperature short-time processing of mobile products such as peas in brine. The cans, pushed by transverse bars along a flattened spiral runway, are first pre-heated in steam, then brought up to processing temperature, held at such temperature, and finally cooled by water sprays. The temperature of the cans is measured with a wire thermocouple over which they pass, and checked with the help of organic compounds of definite melting point sprinkled on the cans. Advantages (short coming-up time, quick process, no inlet or outlet valves, easy accessibility of all parts) and disadvantages (no external counter-pressure on the cans) are discussed.—Beauvais *et al.*, *Food Technology*, 1961, **15**, 5.

CEREALS

Farinograph technique for macaroni doughs

A technique is described for studying the farinogram characteristics of macaroni doughs in the absorption range of 26·5 to 36·0%; this is the general range used in processing macaroni. With the 50-g. bowl attached to the farinograph, the balance linkage is set in the rear position (normal for 300-g. bowl), the instrument is zeroed, and the dampening is set to 0·8 seconds.

Macaroni doughs prepared from various types of wheat may be distinguished from one another by the farinograph. Variation of durum wheat grade has a distinct effect on farinograms. Farinogram characteristics of semolinas produced from durum wheats grown in different years are quite similar for a given variety, provided that protein content does not change significantly. Variation of protein content, temperature, absorption, or particle size produces a distinct change in farinogram characteristics.—Irvine *et al.*, *Cereal Chem.*, 1961, **38**, 153.

Control of fungi during malting of wheat

Low levels of formaldehyde or 8-hydroxyquinoline sulphate completely inhibited growth of fungi on wheat during malting. Mercuric chloride, methylmercuricyandiamide, and *o*-phenylphenate (*Dowicide*) also were effective for control of fungi. Tetrachloro-*p*-benzoquinone, n-propyl vanillate, 2-thiobarbituric acid, thiourea, n-trichloromethylthiotetrahydrophthalimide, and several other substances were more effective than potassium permanganate and the hypochlorites. It is likely that many of these chemicals cannot be used in malting because of their toxicity to animals and humans.

Formaldehyde used in 0·5% concentration in the steep liquor during the last 1 to 6 hours of the steeping period completely controlled growth of fungi during germination. The amount of formaldehyde retained in the finished malt was as little as 0·003 p.p.m. This amount of formaldehyde did not inhibit yeast fermentation and would probably be insignificant so far as human consumption of bread is concerned.—Fleming *et al.*, *Cereal Chem.*, 1961, **38**, 170.

DOUGH

Relaxation of strains in dough

The effect of iodate, *N*-ethylmaleimide and cysteine on the relaxation of strains in dough has been investigated. Strains introduced in dough by the usual procedure of balling and shaping, relax much more slowly in the presence of iodate and *N*-ethylmaleimide. In the presence of cysteine the strains relax more quickly than in the controls.

It is concluded that the relaxation of strains occur through disulphide exchange reactions, and that the formation of a strained system during mixing is also accompanied by the same type of exchange reactions. These observations are discussed in relation to previous work and the action of flour and bread improvers.—Frater *et al.*, *J. Sci. Food Agric.*, 1961, **12**, 209.

FISH

Evaluating freshness of raw fish

Determinations of the contents of volatile reducing substances and trimethylamine nitrogen and of the percentage of pigmented bacteria before and after five hours of incubation at 31°C. (88°F.) are suggested as useful criteria for evaluating the freshness of raw fish samples and estimating the keeping quality at refrigerated storage temperatures above freezing. Applications to flatfish and rockfish fillets, salmon steaks, tuna, and unpeeled beheaded shrimp are given for both experimentally stored and commercial samples.—Farber and Lerke, *Food Technology*, 1961, **15**, 191.

Available lysine content of fish meals

The "available lysine" content of a number of different fish meals has been determined and results are given for the effects of preservation, putrefaction and of azeotropic and steam drying of the fish. Fish flours have been examined and also meals prepared from commercially unwanted species and fish guts. Results have been compared with the "available lysine" and pepsin digestibility of Peruvian fish meal.

Digestibility values $\geq$ 89% were associated with "available lysine" contents of 5·7·5 g./100 g. of protein. Neither azeotropic drying nor solvent washing in the preparation of fish meal reduces the "available lysine" content.—Olley and Watson, *J. Sci. Food Agric.*, 1961, **12**, 316.

Changes in nutritive value during processing

The effects of boiling, steaming, autoclaving and then drying under vacuum and without vacuum on the nutritive value of Bombay duck has been studied. An increase in the release of amino-acids during pepsin digestion and in the pepsin digest residue (P.D.R.) Index was observed after pretreatments, the release of amino-acids and the P.D.R. Index being decreased by drying, to a lower degree in the vacuum-dried product. The retention of amino-acids was higher during vacuum drying.—Sawant and Magar, *J. Sci. Food Agric.*, 1961, **12**, 302.

FUMIGATION

Ethylene dibromide residues in wheat and wheat products

Possible methods for determining bromide remaining as reaction product and as unchanged fumigant in wheat and flour after fumigation with ethylene dibromide (EDB) have been reviewed and tested, and new analytical methods developed. The effects of duration of treatment, temperature, moisture content and milling of wheat on the sorption and desorption of fumigant and on the size of the water-soluble bromide fraction produced during fumigation were determined and the practical implications of the results are discussed. Recommended procedures for the determination of bromide residues in cereal products after fumigation with EDB are described.—Heuser. *J. Sci. Food Agric.*, 1961, **12**, 103.

IRRADIATION

Treatment of onions with gamma rays

Hybrid onions of the Southport White Globe type were stored at 70°F. before and after irradiation with various doses of Co^{60} gamma rays. In lots irradiated two weeks after harvest as little as two kilorads was sufficient to inhibit subsequent sprouting almost completely. When irradiation was delayed until 11 or 17 weeks after the harvest, however, there was little inhibition by doses ranging from 2 to 250 kilorads. The highest dose increased losses from softening of the bulbs.—Mullins and Burr, *Food Technology*, 1961, **15**, 178.

Treatment of potatoes

Idaho Russet Burbank potatoes harvested in October were stored at 40°F. Six, 22, and 32 weeks after harvest, separate portions were exposed to 11 kilorads of gamma rays. In June all tubers were transferred to a room at 70-74°F. During the next eight weeks the controls sprouted extensively, whereas sprouting in the irradiated potatoes was largely, though not completely, suppressed. In contrast to results obtained with onions, the effectiveness of irradiation for sprout control was not affected by delay between harvest and irradiation. Data are presented on total and reducing sugars and on browning tendency.—Hendel and Burr, *Food Technology*, 1961, **15**, 218.

MICROBIOLOGY

Rapid bacteriological test for cooked or cured meat

A rapid procedure is described for the detection of bacteria on the surface of sliced ham or bacon. A solution of 5-phenyl-2-(*p*-2-iodophenyl)-3-(*p*-nitrophenyl) tetrazolium chloride is sprayed on the meat which is then incubated in a plastic bag for 15-30 min. at 37°. Sites of bacterial activity are indicated by the development of a red colour. The application to production work is discussed.—Bradshaw *et al.*, *J. Sci. Food Agric.*, 1961, **12**, 341.

MEAT

Tenderising of beef by chelating agent

The effects of pre-rigor infusion of a chelating agent at various levels on the tenderness of beef was studied. Twenty-one cutter and canner cow rounds were infused with 10, 15, and 20% solutions of sodium hexampetaphosphate, and a 15% solution plus lactic acid (*p*H 5·8). The corresponding control rounds were infused similarly with tap water. Tenderness, as recorded by taste panel and shear, was improved by pre-rigor infusions of all chelating solutions, and no one level improved tenderness more than other levels. A highly significant negative correlation of 0·42 existed between taste-panel scores and shear values. Extractable nitrogen was not a reliable indication of tenderness. The *p*H values were higher and glycogen values lower for treated samples at 48 hours than at zero hours, indicating that glycolysis was not interrupted by infusion.—Carpenter *et al.*, *Food Technology*, 1961, **15**, 197.

PACKAGING

Insect penetration of paper sacks

Seven types of materials used for storage of produce (maize, groundnuts, etc.) were tested for penetration by nine species of insects which infest such produce. The relative values of the materials for preventing damage to the produce were determined and recommendations are made as to suitable materials in certain cases and the procedure which should be followed in the storage of produce.—Davey and Amos, *J. Sci. Food Agric.*, 1961, **12**, 177.

PRESERVATION

Antibiotics as food preservatives

In recent years, food research workers have had to deal with two new and potentially important methods of food preservation, viz., ionisation and antibiotics. Among the antibiotics which might be used for this purpose are those of the tetracycline group, and nisin; the latter is not used at all in human medicine. Tests carried out by the Danish Meat Research Institute, Roskilde, and in other countries have shown promising propects, and the risks to public health appear to be minute. Although the use of antibiotics for food preservatives is at present prohibited in Denmark, there is a possibility of exemptions to be granted from this regulation. This will probably be done, subject to suitable precautions, in order to enable the food industry to investigate the effect of new food preservation methods—Hansen, D., *Die Fleischwirtschaft*, 1961, **13**, 116.

Effect of antibiotics and radiation on fresh beef

The application of 7 p.p.m. of chlortetracycline to the surface of beef followed by irradiation with 0·1 megarad resulted in more effective inhibition of microbial growth during storage at 34°F. for 30 days than the independent use of antibiotic and radiation. The useful limits of chlortetracycline concentration are 0·5 to 10 p.p.m. and the most suitable radiation dose is 200 kilorads. Tetracycline and oxytetracycline were also effective, the former manifesting maximum inhibition. Storage of meat at 34°F. was considerably superior to 40°F. irrespective of the treatment. Microbial counts were lower in treated meat packaged in *Saran* film than in Cellophane and polythene.—Phillips *et al.*, *Food Technology*, 1961, **15**, 13.

Effect of sulphite on peeled potato

Dipping potato chips in a solution of metabisulphite of concentration 0·5-1·0% (w/v) at *p*H 5·3-6·0 was the most effective treatment for retarding enzymic browning. Temperature had a direct influence on storage life: at 5° chips could be stored for 7 days and at 1° for 14 days. Dipping potatoes in metabisulphite solutions caused no immediate loss of thiamine, but there was a loss of 24% of the vitamin in 3 days during storage at 5°. Losses up to 30% may be experienced when sulphited raw potatoes are boiled immediately, compared with about 15% for untreated tubers. Frying potato chips normally results in a loss of about 10% of thiamine, and if dipped in sulphite solution a loss of 35-45% occurs which increases to 75% after 30 min. on a hot plate.—L. W. Mapson and H. G. Wager, *J. Sc. Food Agric.*, 1961, **12**, 43.

PROTEIN EXTRACTION

Large-scale protein production from leaves

Juice from fresh, pulped, leaves is freed from most of the starch grains, fibre and detritus and coagulated quickly with steam. The protein coagulum is filtered off, washed with water at *p*H 4 and pressed into blocks with 30-40% dry matter. In this form it keeps under refrigeration. Texture, colour and nutritive value of the final product are determined by the conditions of drying. The precautions needed during drying, especially freeze-drying, are described. The products are fairly stable at room temperature but lipids have to be removed before the protein will keep permanently. The conditions for doing this by acetone extraction are described. The composition of the protein and the uses to which it can be put are described briefly.—J. E. Morrison and N. W. Pirie, *J. Sc. Food Agric.*, 1961, **12**, 1.

Extraction from green leaves

Extraction of nitrogenous material (especially protein nitrogen) from leaves of different species has been studied using the Pirie steel press, which grinds small quantities of leaves by forcing them through a narrow slot. Extraction of young tobacco leaves is comparable with high-speed maceration and

sedimentable material is more dispersed; increased extraction under alkaline conditions is largely due to greater dispersion of chloroplasts, appreciable at 1,500 *g*, but only slight at 12,000 *g*; a total of 90-95% extraction of nitrogenous material is obtained with the use of detergents to release nitrogen from residual fibre after initial extraction in the press. Comparatively less nitrogen is released from macerated fibre.—Festenstein, *J. Sci. Food Agric.*, 1961, **12**, 305.

STORAGE

Effect of moisture content on Brazil nuts

Current practice in the collection, handling and storage of Brazil nuts is described. Laboratory and field methods of determining moisture contents, the relationship between moisture content and relative humidity, and the effect of moisture content on respiration rate have been investigated. In storage experiments, deterioration was slow both at very low and very high moisture contents whereas rather rapid spoilage occurred at intermediate levels. These findings are discussed with reference to current commercial practice and work on other seeds.—G. Ayerst and D. Budd, *J. Sc. Food Agric.*, 1960, **11**, 390.

Temperature effect on bulk fruit packs

Frozen strawberries and raspberries packed in 30-lb. tins were about 2-3 times as stable as similar fruit in retail packages. In general, colour and flavour stability was further increased in remanufactured products such as preserves and ice cream. The temperature quotient for colour and flavour in strawberries, raspberries and blackberries was definitely lower in preserves than in thawed fruit, indicating that the preserve form had less sensitivity to a rise in temperature. Data on the high-quality life of these berries in frozen and preserve form are given for temperatures in the range 0-30°F. Data on reduced ascorbic acid retention and the ratio of reduced to total ascorbic acid are presented and discussed.—Guadagni *et al.*, *Food Technology*, 1961, **15**, 207.

Heat treatment of pre-packaged meat products

The durability of pre-packaged fresh meat at room temperature can be extended to a period of several months if the meat product has been packaged under vacuum in heat resistant plastic bags and has then been subjected to heat treatment in counter-pressure autoclaves. The method is, however, not suited for certain types of sausages and ham where the appearance of the meat product is thereby impaired. On the other hand, the durability of such products as "hot dogs" can be significantly improved by subjecting them to heat treatment in their own skin. The length of time for which the product can be stored depends mainly on the initial bacterial count.—O. C. Schmidt, *Die Fleischwirtschaft*, 1961, **13**, 199.

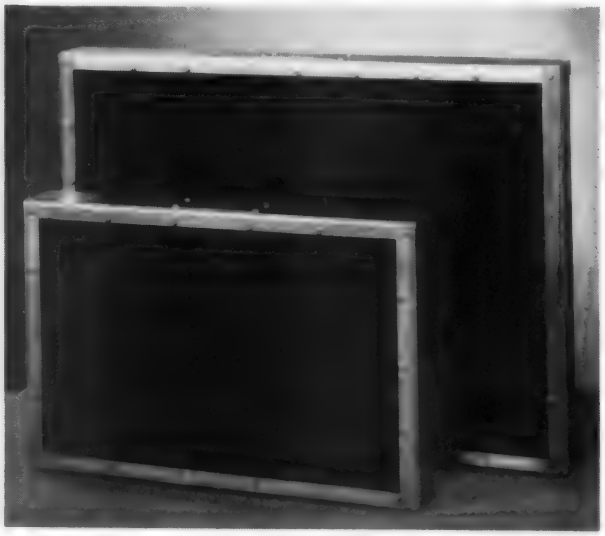
Get Rid of That Smell!

(*Concluded from page 293*)

vated charcoal beds with deodorant agents which add to the effectiveness of odour control.

Odour masking and odour counteracting

Considerable progress has been made in recent years in *odour masking*. In this scheme, a masking agent with an acceptable but stronger odour than the offending compound is injected into the waste gas stream. The effect of such treatment is to render the plant's emitted odour less objectionable, literally by overpowering it, and without actually eliminating it. Typical examples of odour masking agents are o-chlorophenol, pine oil, and camphor.



Two Holmes standard catalyst elements are used for the Holmes catalytic process. Shown here, they are the type C2 (18×12×2⅛ in., capacity 320 s.c.f.m.) and the type D2 (18×24×2⅛ in., capacity 700 s.c.f.m.).

A main advantage of odour masking methods is that they call for only minor capital expenditure (use of automatic proportioning pumps in this service is on the increase). The chief cost is the continuing expense for the odour masking agent. Selection of the agent most suitable for a particular application is highly complex. Several organisations are specialised in the business of formulating and manufacturing such materials and most food processors leave this task to the care of the professional.

Once a suitable odour masking compound has been selected, and the best place for its introduction into the industrial waste system has been determined, it is still necessary to study its effectiveness, especially during the initial stages of its use by making an odour survey in the area surrounding the plant.

By contrast, *odour counteraction* employs pairs of odours which are antagonistic to each other and tend to neutralise each other when smelled simultaneously. This approach is used especially in combating multiple and complex odour sources. The odour counteractant (e.g., chlorophyll) is introduced into the main air movement, from the plant, usually at some point near the top of the discharge stack. By the time the air movement reaches the surrounding area, the counteractant is well mixed with the objectionable odour.

Once again, the selection of the counteractant to solve a particular odour problem must be left to the professional. Suppliers of odour masking agents are usually also in a position to supply the food industry's needs for counteractants.

MACHINERY and EQUIPMENT

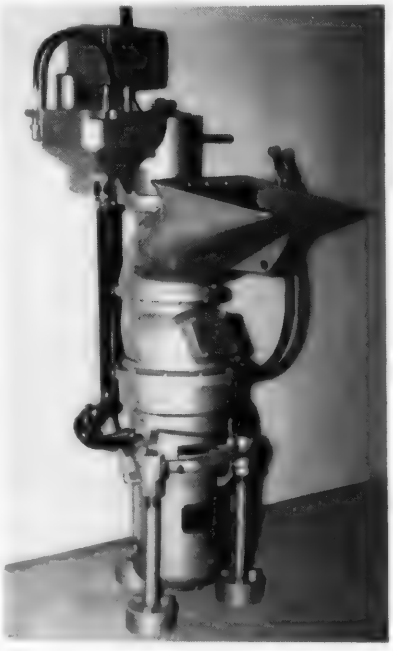
WASP DESTRUCTION

Disinfestation Service have produced a bait, *Waspex*, for destroying wasps. The bait consists of a material highly attractive to wasps containing a carefully balanced concentration of a chlorinated-hydrocarbon insecticide, designed to have a delayed killing action. The baits, in weatherproof containers, are placed on walls, ledges and sills all round the outside of the building. Wasps are thus attracted to take their fill of food *without entering the premises*, are not killed on the spot but return to the nest, possibly up to three miles away, where they pass the poisoned food on to the queen and her larvæ and so destroy the colony. Last year, Disinfestation carried out 300 field trials, mostly at food factories, in all parts of the U.K. *Waspex* is provided on a servicing contract, protection being maintained throughout the season by means of periodic inspections by Disinfestation pest control operators.

A pest control expert of Disinfestation Service places a "Waspex" bait container outside premises which attract wasps.

WASTE DISPOSERS

A new range of *Disposomatic* heavy-duty waste disposers has recently been introduced, and are suitable for food processing factories, abattoirs, canteens, etc., where large amounts of waste have to be disposed of quickly and hygienically.



The "Disposomatic" heavy-duty waste disposer.

The range covers ¾ h.p. to 3 h.p. and the price begins at £120 for the smallest model to £340 for the 3 h.p. unit. (There is a price variation on each unit according to the type of hopper required.)

There are a variety of alternative methods of installation and the manufacturers produce special hoppers and funnels for individual applications.

A feature of the machine is powerful jets of water impinging into the teeth of the cutter ring from the periphery of the pulversing impeller. These jets speed the breaking up of waste as it is forced against the cutter teeth by the impeller and also wash the machine clean after use. Vital parts subject to corrosion are made in stainless steel. Details on application.

SIMPLE TEMPERATURE DEVICE FOR FROZEN FOODS

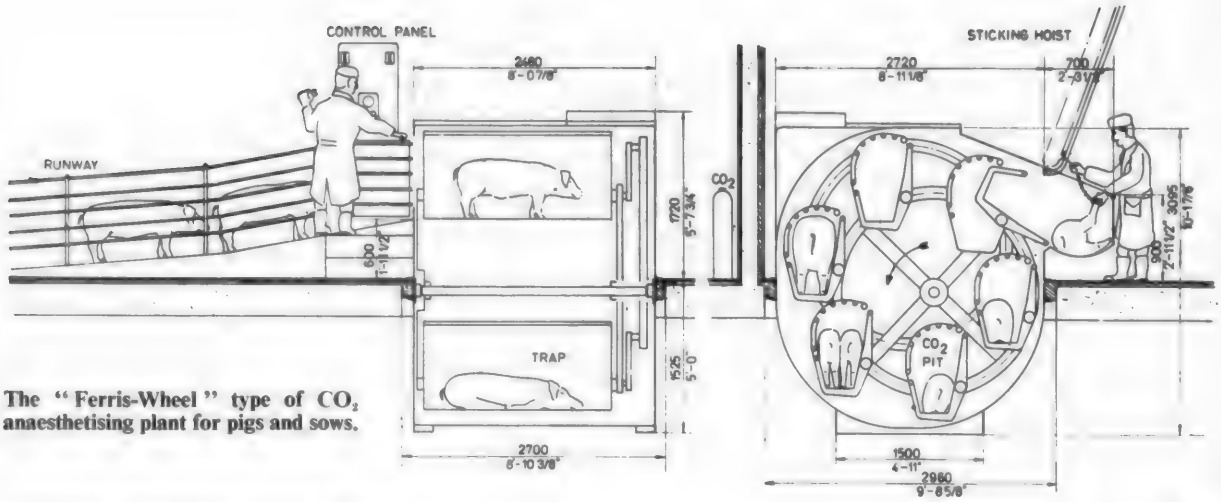
A time-temperature integrator, resembling a cigarette in appearance and weighing a fraction of an ounce, has been developed by an American company to tell what happens to frozen food temperatures over periods of time.

If frozen food is raised above 0°F. for any length of time there is a risk of quality loss. The new device is simply placed with packages and follows them through transit or in storage. It senses and records time and temperature as an integral function and the combined information is shown on a tiny scale. Inspectors can then tell if the food has been allowed to go above zero for too long a period.

The new device which acts like a small electrolytic battery, has no moving parts, no external wiring or power sources. It is sealed in plastic and requires no protection. It is discarded after use. The provisional price in America is given as a dollar each. Details on application.

FORK TRUCK ATTACHMENT

An attachment to fork lift trucks, enabling pallet loading heights to be pre-selected has been produced by a company in Buckinghamshire. This device, the *Autostak*, enables the forks to be set for loading or unloading automatically to any number of heights, by pushing a selection button and operating the lift valve lever, which is held electrically until the selected height is reached. Speed, accuracy, reduction of driver fatigue and safety are features of the new attachment. Details on application.



The "Ferris-Wheel" type of CO_2 anaesthetising plant for pigs and sows.

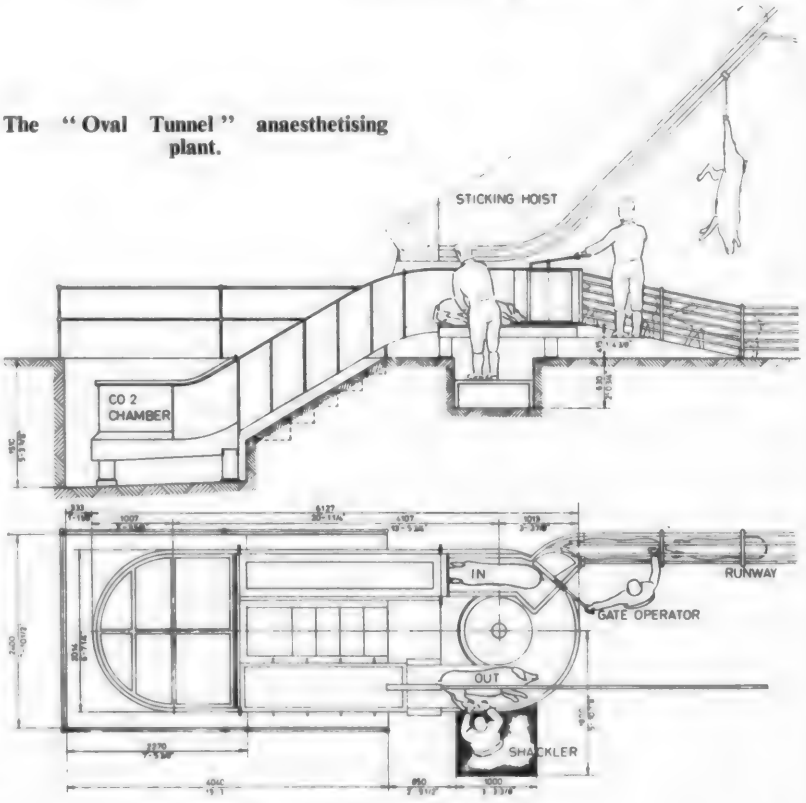
ANAESTHETISING PLANTS FOR PIGS

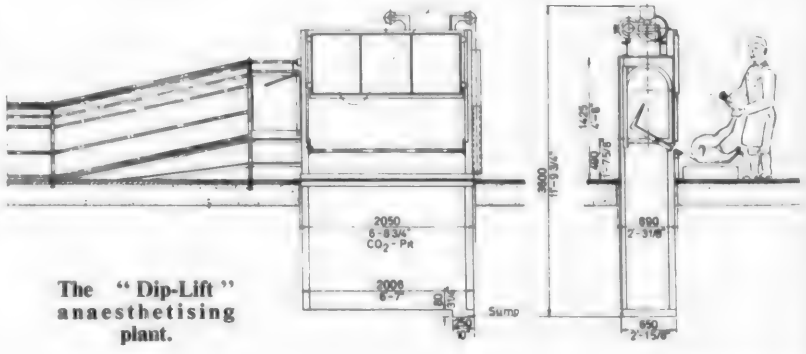
Alexandra Separator Co. are the agents for three types of Danish-built anæsthetising plant for pigs and sows. Pigs are conveyed to the anæsthetising chamber which has a high concentration of CO_2, and after 15 sec. in the chamber the pigs become unconscious. After a further 30 sec. they are conveyed into the normal atmosphere and will remain unconscious for one to two minutes. In practice, 30 sec. are more than sufficient to shackle, hoist and stick a pig. The anæsthetising is done noiselessly and automatically by the plant itself, the operations required being limited to three: manœuvring the pigs through the entrance gate, shackling the sleeping immobile pigs, and sticking them.

The *Ferris-Wheel* type is designed for killing rates from 60 to 360 pigs per hour. The plant can be provided with three or six traps. The capacity of a three-trap plant is 100 traps per hour. Each trap is capable of taking one sow up to a live weight of approximately 700 lb. or it can take two smaller pigs at a time. The capacity of a six-trap plant is 200 traps per hour. The pigs are admitted, one at a time, through a gate into the traps suspended as gondolas in a ferris-wheel. The plant has two operation positions, one at the gate, when the pigs enter and one position when the anæsthetised pigs are tipped automatically out of the trap on to a tray at a convenient height for the operator to shackle.

The *Dip-Lift* type is designed for killing rates of 40 sows of any size, or 80 pigs. The pigs or sows are admitted, one at a time, through a gate into a big trap which descends into the gas chamber, and is lowered by means of an electric hoist. When the trap returns to its top position the anæsthetised pigs will automatically be tipped sideways out of the trap, which will then be ready to receive the next animals. A time switch ensures the minimum anæsthetising time for the animals.

The "Oval Tunnel" anaesthetising plant.





The "Dip-Lift" anaesthetising plant.

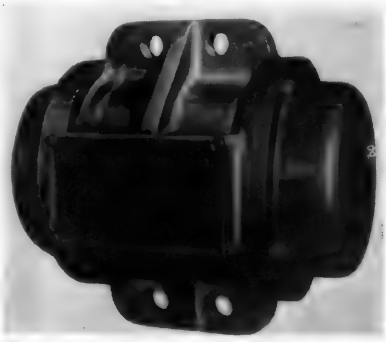
The *Oval Tunnel* type operates at killing rates varying from 120 to 240 pigs per hour, when the live weight of each pig does not exceed 250 lb. The pigs are admitted, one by one, through a gate to an endless oval-shaped conveyor divided into 10 compartments. The conveyor transports the pigs continuously, one in each compartment, through the lower part of the oval tunnel containing the CO_2 and up again on the return side. Other types of *Oval Tunnel* plants take sows as well, with capacities of up to 500 pigs per hour.

NYLON APRONS

J.C.P. Industrial Clothing, Ltd., have now marketed a completely new range of lightweight nylon aprons. These new aprons are completely re-resistant to fats, oils, solvents grease, water, etc. The makers say that thorough tests have confirmed that the apron withstands the most severe working conditions, and has received a favourable reception from employees who wore it. The aprons are fitted with standard reinforcement patches, and nylon tie-tapes for extra strength. The large size of the apron weighs only a few ounces, yet it is claimed that the high resistance to abrasion and tear strength is far superior to the more common aprons of P.V.C. and rubber, and more economical. They are available in a range of colours.

ROTARY ELECTRIC VIBRATORS

To standardise production and provide deliveries of machines and spares from their stockists throughout the world, Sinex Engineering Co., Ltd., are discontinuing the manufacture of the three types of their vibrator, lug-mounting, plate-mounting and pin-fixing body castings, and will in future only manufacture lug-mounting bodies. Three types of adaptor will, however, be available; a channel adaptor, a plate adaptor and a pin adaptor. The standard machine can thus be used for any application and is interchangeable with any old type machine.



The lug-mounting body now being standardised by Sinex for their vibrators.

One of the new nylon aprons introduced by J.C.P. Industrial Clothing, Ltd.

AUTOMATIC TRAVELLING OVEN

An automatic travelling oven which requires less than half the space and which reduces baking times by 50% and more by means of special *Redifon* high frequency dielectric heating units in addition to normal radiated and convected heat has been developed by Baker Perkins, Ltd.

Trials on a full range of biscuits were carried out in the Liverpool factory of W. and R. Jacob, Ltd., under normal production conditions. The quality of biscuits produced was fully maintained and the application of high frequency improved the control of moisture content.

This new oven will have a place in future biscuit factories, particularly where there is a need to save floor space. Production models of the oven will be available next year.

Certain existing ovens in the Baker Perkins range can be adapted to incorporate high frequency units to give a worthwhile increase in output, though not to the extent of the fully integrated design.

POTATO PRE-PACKING MACHINE

A recently introduced potato weighing and pre-packing machine is a compact unit consisting of two belt elevators on which are slats. The potatoes are fed from a brusher to a hopper through which the elevators pass. The potatoes are then elevated and at the top, drop into scale hoppers. When the required weight has been achieved the scale drops to its lower limit and by an electronic device the elevator comes to a stop. The operator tips the hopper so that the potatoes drop into a polythene bag she holds, ready for sealing and despatch. When the scale recovers its zero level the elevator commences working again. Incorporated in the weighing unit is a photocell and light head together with a simple mechanism which stops and starts the elevator.

DENSITY GAUGE

A gauge designed to indicate density changes in liquids, solids, slurries, etc., has recently been introduced. The system consists of a Caesium 137 source "looking through" the inspection volume (normally a pipe of between 4 in. and 10 in. diameter) at a 5 in. diameter by 2 in. thick plastic phosphor mounted on a 5 in. photomultiplier. The amount of radiation which reaches the detector is dependent on the density of the material in the process. The photomultiplier is arranged to give a signal which is monitored by a Honeywell Brown recorder with a suppressed zero, so that the required variations in density are covered by the recorder scale. Density value and scale sensitivity are controlled by varying the Honeywell Brown zero suppression and span. Details on application.

ELECTRIC MELTING KETTLE

An electrically heated melting kettle, with a total capacity of 10 gal., has been designed for heating high-viscosity materials to a pouring density. A heated hose of 2 in. nominal bore 3 ft. in length is controlled by the same thermostat which controls the contents, thus allowing the contents to drain cleanly through the valve and pipe. The outlet valve is operated by a lever centred over the control panel. Details on application.

FLOOR MAINTENANCE MACHINE

A new floor maintenance machine, the *Triumph*, has been designed to be quiet, small, light and easy to use, and is said to have a working capacity equal to other machines twice its size. A wide-aperture suction eliminates pre-sweeping and minimises dusting. Details on application.

FIBREGLASS PLASTIC VESSELS

We regret that under the above heading on p. 253 of our June, 1961, issue the name of the U.K. agents for these vessels was omitted. The agents are Albrin Products, Ltd.

The makers of *Wen-Plast* vats are Hvenplast of Ystad, Sweden, and not the organisation stated, which is a marketing organisation only.

PACKAGING

(*Left*): **A full colour vignette of the contents of " Phipps " fruit cans is shown on labels on each side of the can. Brief cooking instructions are given on the reverse side of the " Barcastle " cans.** (*Right*): **The surface design of these Polytainer bottles is by Metal Box Co. Crowner labels give the price and two recipes.**

New label designs

A new range of labels has been designed by the Package Design Studio of the Metal Box Co., Ltd., for Zwannenberg Associated Food Products, Ltd. This range of labels was designed to cover a number of products under two brands, *Phipps* fruit and vegetables and *Barcastle* meat products, both marketed by Whiteley, Muir and Zwannenberg, Ltd. The basic design consists of a two-colour background surrounding two panels, one on either side of the can. Black is the background colour used for the upper part of all the labels; the second background colour is red for the fruit products, green for the vegetable products and yellow for the meat products.

Plastic squeeze bottle for coffee

A *Poly-Tainer* plastic squeeze bottle, manufactured by the Plastics Group of the Metal Box Co., has been chosen for *Instant Presto* coffee and chicory essence made by the Scottish Co-operative Wholesale Society, Ltd. It is possible to control the flow of coffee essence to individual requirements and it has the added advantage of being virtually drip-proof. Apart from its use in the home, it is ideal for all outdoor occasions.

Polythene lined cartons

Polythene lined *Diotite* cartons, measuring 5½ in. by 4¼ in. by 1 in. deep, have been adopted by Bowyers (Wiltshire Bacon), Ltd., for their Fresh Frozen Cutlets and Pork Chops. The cartons, which are made of waxed white *Duplex* board, are of the end-opening style and are drywaxed externally, the lining being of 150 gauge polythene. Supplied flat with the side seam already joined, the packs are erected and heat-sealed on standard Metal Box *Diotite* machinery. The polythene lining acts as a thermoplastic adhesive, giving an efficient and moisture tight seal. The surface decoration, printed in full colour by offset lithography, was designed by the Speke Studios of the Metal Box Design Services.

Squeeze tubes for Russian caviar.

Bubble containers

The Packaging Division of Gordon and Gotch, Ltd., has designed two new *Bubblepacks* which can be used as handy containers for a wide variety of items after the packaged product has been taken out of the transparent bubble. Both *Bubblepacks* are heat-sealed and one is opened by cutting out two " tear here " notches on a card on either side of the bubble and opening the bubble's flip-top style lid. The other model is pyramid-shaped with smooth, round edges. The peak of the bubble is snipped off and the *Bubblepack* is turned upside-down, enabling the product to fall out. As with the first model, the process of taking the product out leaves the *Bubblepack* in perfect order for re-use as a container.

Self adhesive tape

Produced in white and five colours, the *Takstrip* self adhesive tape made by Samuel Jones and Co., Ltd., stores well in high humidity areas and gives good performance on either hand or automatic sealing machines. It is available in several widths and is thin, strong, flexible, non-stretching and non-shrinking.

Caviar in tubes

Caviar, through special tube packaging, is being given a wider appeal. Called *Troika*, it is of the pressed variety and is imported, packed and distributed by W. G. White, Ltd., Britain's biggest caviar importers.

NEWS DIGEST

Irish Sugar Co.'s A.F.D. Plant opened by Eire's P.M.

"Turning point in history of food processing"

The accelerated freeze-drying plant of the Irish Sugar Company at Mallow, Co. Cork, was formally opened on Wednesday, May 24, by the Prime Minister of Eire, Mr. Sean Lemass. Among those present were the chairman of the Irish Sugar Company, Mr. J. E. McEllin, and directors of the company; members of the Irish Government and Parliamentary Opposition; and representatives of Vickers and of the British Food Industry.

A large part of Mr. Lemass's speech was devoted to analysing disturbing features of international trade which were unwelcome for a country such as Ireland which relies greatly on agricultural exports. Industrial nations, he said, were increasing their own agricultural production and protecting home producers, often regardless of cost.

After the new factory had been blessed by the parish priest of Glantane, the Very Rev. M. O'Keefe, Mr. Lemass said that the enterprise was an ideal undertaking for the conditions of Ireland. Its products would mainly be exported. The raw materials would be supplied by Irish producers and would be of the highest quality; the technical excellence of the plant, the skill of the plant's workers and the capacity of its management would ensure that the finished products would be of the highest grade.

Mr. Sean Lemass, Prime Minister of the Irish Republic, cuts the tape across the main entrance of the Irish Sugar Co.'s new food processing factory at Mallow. On the right is Mr. J. E. McEllin, chairman of the company. (FOOD MANUFACTURE photo.)

The meat preparation department. (FOOD MANUFACTURE photo.)

After his speech Mr. Lemass was presented with a silver goblet of A.F.D. foods by Mr. McEllin, chairman of the Irish Sugar Company. Mr. McEllin paid tribute to the work of the British scientists at Aberdeen and to the technical executives of Vickers-Armstrongs, all of whom he said had co-operated without stint. In an address later the same evening at a dinner to celebrate the event at the Great Southern Hotel, Killarney, Mr. McEllin again paid tribute to the team of workers at the M.A.F.F. Aberdeen establishment and complimented Vickers-Armstrongs, and said that no words can be combined to form a tribute adequate enough for the debt which the nation owed them.

The company made it known that first supplies of A.F.D. foods will be sold in bulk containers, followed later by catering packs, and that consumer packs were expected to be on the market in about six months from the date of opening of the plant.

A description of the plant is published on p. 275 of this issue.

B.I.B.R.A.'s Director Appointed

Dr. Leon Golberg, D.SC., D.PHIL., M.A., M.B., B.CHIR., F.R.I.C., has been appointed director of the British Industrial Biological Research Association and it is expected that he will take up his appointment towards the end of the year.

The Association was formed in 1960, with the support of the Department of Scientific and Industrial Research, to carry out toxicological investigations on substances used in the production, processing and packaging of food and cosmetics. As director of the Association, Dr. Golberg will have the main responsibility of planning and executing the research work of the station.

Dr. Golberg was born in Cyprus and was educated in South Africa, where he graduated in 1935 with a first-class honours degree in organic chemistry, qualifying the following year as M.SC in physical chemistry. He then came to the U.K. and for two years was a member of Sir Robert Robinson's research team at Oxford, carrying out investigations in organic chemistry. In 1939 he returned to South Africa, remaining there throughout the war. After the war he returned to the U.K. and studied medicine in London and Cambridge. In 1951 he became senior lecturer in chemical pathology at Manchester University and in 1955 became medical research director of Benger Laboratories, Ltd., where he is at present.

Buxted-Polpak merger means ½ m. chickens a week

The Reeden Group, who produce Polpak Chickens and Polpak Turkeys, have joined the Buxted Chicken Co., which means that Buxted, the largest chicken producers in Europe, can claim the same dominance in the turkey market. This new deal brings the output of the Buxted Group to half a million chickens a week.

Fascinated by the marshmallow machine are (from right) *Len Chalmers, Frank McLintock, Ken Leek, Mr. E. Brown* (*Meredith and Drew production manager*), *Mr. T. Barton* (*development officer*) *and operators, when Leicester City F.C. visted the Meredith and Drew biscuit factory at Ashby.*

British Rayophane, Ltd.: new selling arrangements

Sales of Rayophane transparent cellulose film are now being handled by British Rayophane, Ltd., from their offices in New Fetter Lane, London, E.C.4, and Sunlight House, Quay Street, Manchester. The selling agency arrangements with Felber Jucker and Co., Ltd., expired on February 4.

PIDA record

Latest addition to the Pig Industry Development Authority's range of free publications is the *PIDA Record*, a quarterly eight-page newsletter.

In the foreword Sir Archibald Nye, PIDA's chairman, says the publication has two main purposes—to explain what PIDA are doing and why they are doing it, and to offer information and guidance about modern trends, methods and techniques of pig husbandry. Sir Archibald adds that if the British pig industry is to prosper it must become more efficient "and efficiency means raising the quality of pigmeat and reducing the costs of producing it. PIDA's livestock schemes are intended to do just this."

Wall's to buy 18,000 tons of milk from M.M.B.

At a press conference in London on May 17, under the chairmanship of their marketing director, Mr. J. A. Beer, T. Wall and Sons (Ice Cream), Ltd., stated that they will probably buy 18,000 tons or 3·6 million gallons of concentrated liquid skim milk from the Milk Marketing Board in 1961. Skim milk is the basic ingredient of all ice cream and Wall's have been obtaining the bulk of their supplies from New Zealand in powder form, but in 1956 Wall's began to explore the possibility of supporting the home dairy industry and bought a small quantity of concentrated liquid skim milk from the M.M.B. Last year Wall's produced two out of every five or six ice creams eaten in this country, out of an estimated total of 50/60 million gallons. Wall's production figures in recent years range from nearly 7 million gallons (ice cream and water ices) in 1945 to 20 million gallons in 1960. In 1959 the total was 23¾ million gallons. Since 1958 production of dairy ice cream has increased from 1 million gallons to 5 million gallons or from 5 to 25% of total production.

Canned goods production January to March

Production figures in the U.K. of canned and bottled fruit, canned vegetables and canned soups in the first quarter of 1961 were, respectively, 14·3, 135·8 and 50·2 thousand tons. Processed milk and canned meat products figures for the same period were 21·4 and 14·2 thousand tons.

Mr. A. Araouzos, Minister of Commerce and Industry for Cyprus, with Mr. Eliades, a member of his staff, seen with Mr. B. Johnson (left) *export sales manager for the A.P.V. Co., Ltd., inspecting a row of Paraflow heat exchangers in the A.P.V. works.*

Glass container sales hit new record in 1960

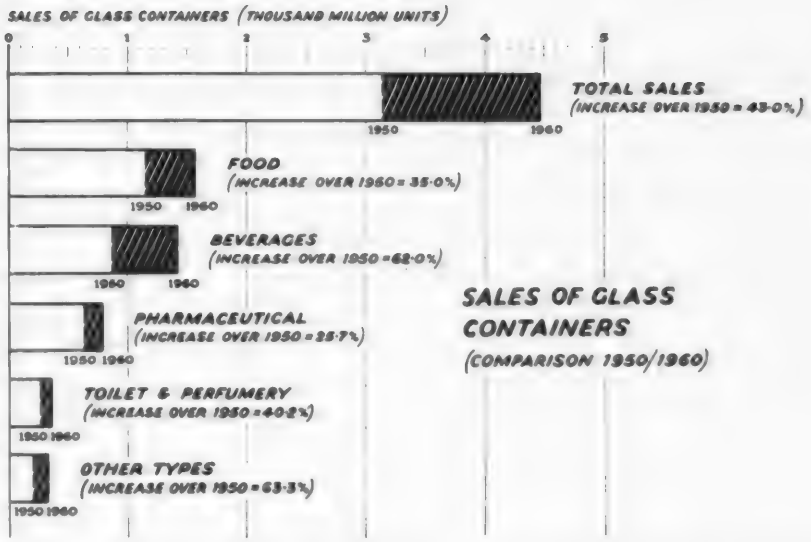
Sales of glass bottles and jars in 1960 once again improved on the previous year's figures, attaining a record level of 4,468 million units. This total represents an increase of 7·5% over sales in 1959 and of 43% over the 10 years since 1950. The most spectacular increase was recorded in the use of glass containers for packing beverages, including beer, wines and spirits and soft drinks, and the greatest volume of sales was credited to the food industry.

Whiteside expansion in Italy

H. S. Whiteside and Co. are expanding into the Italian market with a new company, Sun Pat S.p.A., which has been set up to manufacture some of the Group's leading products in Italy. T. A. Barnes, chairman of the Whiteside Group, is president, with Signor F. Gazzoni Frascara as vice-president and Dr. Germano Frascara as managing director. Other representatives of both the English and Italian interests have been appointed to the board of the new company.

Kippers in the bag

Birds Eye have introduced a new pack of quick-frozen kipper fillets, in addition to their standard pack, which allows housewives to cook them without the smell spreading all over the house and without dirtying a pan. These fillets, with a pat of butter, are vacuum packed in a transparent nylon bag, brought from the frozen food cabinet in a protective outer carton. If the kippers are frozen solid, the bag should be placed into boiling water for 10 mins., but if the fillets have thawed out, they need only 6-7 mins. The nylon bag should then be lifted from the pan of water, cut across the top with a pair of scissors and the fillets are ready to serve.



A diagram showing how the sales of glass containers have increased in recent years.

Milk bottles still cheapest

Figures by the Glass Manufacturers' Federation show that in spite of a move towards slightly lower prices in the non-returnable milk container field, the returnable milk bottle remains by a very wide margin the most economical milk container.

80% of total liquid milk sales go to the consumer via the doorstep, while a further 4% is consumed by children at school allowing full advantage to be taken of the economies of the returnable bottle.

The initial cost of an unenamelled pint milk bottle is about 4½d., the exact price depending upon the quantities taken at one time. It is estimated, however, that each of these bottles will undertake as many as 40 to 50 journeys before being discarded, and indeed, one leading dairy claims an average of over 52. So, on the basis of these figures, and taking into consideration a figure of about 2d. per gallon to cover the cost of the necessary washing and sterilising machinery together with that of the labour required, the total cost of the pint bottle per journey is reduced to between 0·30d. and 0·38d. and usually approximates more closely to the lower of these two figures.

This photograph shows one of the five new machines, together costing £32,500, that have recently been installed in the main factory of Venesta Foils, Ltd. Incorporating the latest control devices for producing tight, consistent reels of finished aluminium foil, they include specialist high-speed reeling machines for very thin electrical condenser foils and for paper or foil film laminates.

A.F.D. symposium

A symposium on the freeze-drying of foods will be held at the Borough Polytechnic, Department of Chemistry and Food Technology, on October 19 and 20, 1961. The symposium will deal with the development of freeze-drying techniques, will survey the commercial equipment at present available and discuss the potentialities of the technique in various branches of the food industry. Nutritional aspects will also be included. The panel of lecturers will include a number of persons who were concerned with the development of A.F.D. at Aberdeen and others who are at present installing and operating commercial equipment. Pilot plant and model freeze-drying equipment, samples of freeze-dried products and packaging materials will be on display.

Further details can be obtained from the Secretary, Borough Polytechnic, Borough Road, London, S.E.1.

Fork lift truck hire service

We are asked to point out that the information on p. 37 of our January issue concerning Geo. Cohen, Sons and Co.'s fork lift truck hire service, which we published in good faith, is incorrect in that it is not the first such scheme to be operated in this country.

New Buxted factory at Boreham

A £350,000 process factory which will treble production of table poultry, is being built in only 27 weeks for the Buxted Chicken Co. at Boreham, Essex. The new buildings comprise a single storey process factory and holding cold store 240 ft. long and 160 ft. wide. The factory is steel-frames and clad in abestos and patent glazing. Administrative offices, also steel-framed, are brick built. Both buildings have flat roofs of metal decking.

Food Machinery Association AGM

The Eleventh Annual General Meeting of Food Machinery Association was held at the Hyde Park Hotel, London, on May 9. The retiring chairman, Mr. Leslie Clarke, was appointed president and the following officers were elected: Mr. J. C. Taylor, chairman; Mr. R. C. Webster, vice-chairman; Mr. W. Samson, honorary treasurer.

Birds Eye refrigeration advisers

The most rigid care and control in the processing, storage and delivery of quick-frozen foods can be defeated by carelessness or lack of knowledge on the part of the retailer, say Birds Eye, who believe that the reputation of the industry now hinges largely on the way quick-frozen food is handled after it reaches the shop. They have, therefore, appointed eight refrigeration advisers, now being groomed for the job by an intensive course at the company's headquarters. The ever-expanding popularity of quick-frozen food and the increasing variety of food available in this form, has led to cabinets being installed not only in the bigger shops but in the grocer-on-the-corner. Birds Eye say: "It is pointless to have a rigid system of quality control inside our own company if the standard crashes immediately we hand the goods over. . . . We have been rather appalled at the way some frozen foods have been kept, but it is encouraging to know that this scheme has been welcomed by the retailer, who is often out of his depth on technical matters."

Mr. Fred Bearman pats Danny Blanchflower on the back as he receives the cup from the Duchess of Kent at Wembley. Mr. Bearman is a double chairman; he is head of Edme, Ltd., the malt extract manufacturers, as well as chairman of Tottenham Hotspurs' victorious team.

Mr. W. Haxton, Heinz northern factories manager, welcomes Colonel C. Reid and his party from the Industrial College of the Armed Forces, Washington, D.C., when they visited Heinz's Kitt Green factory. On the right is Dr. G. Tattersall of Heinz head office quality control.

News from Scotland

"Broiler" rabbit developments

The new "Norscot" organisation is being geared up to make the North-east of Scotland the very hub of the rabbit meat industry. The idea of central units for dealing with the output of producers over wide areas plays a very big part in the plans of the enterprise. Such a unit is already being put into effect in East Aberdeenshire at Fraserburgh, where processing and packing will start very soon, and it will serve the whole area north of Angus. Another unit at Dundee will serve Angus, Perthshire and Fife.

These big developments in the new domestic rabbit boom in Scotland were revealed by Mr. G. H. M. Bland, Inverurie, well-known figure in meat exporting business, when he talked recently to the newly-formed Deeside rabbit producers' group at Banchory. He said the initial central unit now being set up at Fraserburgh would not be merely a packing station, but much more. Combined with it eventually would be a rabbit progeny testing station, a full advisory service for producers, killing, processing and packing departments, a pelt processing department, a quick freezing plant, a low temperature storage and a modern collecting, distribution and marketing organisation.

Flour mill reconstruction

The Scottish Co-operative Wholesale Society, Ltd., has completed reconstruction of its Regent flour mill in Glasgow, the work being undertaken by Henry Simon, Ltd. The programme has involved the replacement of all the machines as well as considerable rebuilding of the structure of the mill to accommodate the new plant.

New Lyons depot

A £100,000 depot is to be constructed at Sighthill Industrial Estate, Edinburgh, for J. Lyons and Co., Ltd.

Campbell's Soups announce sales figures

For the first time since entering the British market two years ago, Campbell's Soups, Ltd., has announced its sales figures. The company also cited statistics showing that total soup production in Britain had increased by more than 25% during the two-year period. Mr. Beeby, the managing director, reported that Campbell's sales to date have been 2½ times larger than the company's original estimates. "Since entering the market in 1959, sales have exceeded £5,500,000, the equivalent of two cans for every person in Britain." He added that when Campbell's entered the market, condensed soups were little known but now more than 29% of canned soup sales are condensed soups and 60% of those is Campbell's.

Callard and Bowser acquire Rolls confectionery

Callard and Bowser, Ltd., have acquired the manufacturing facilities and goodwill trade names, *Romance, Ace of Hearts, Whispers, Mint Chocs* and *Nut Bar*, of Rolls Confectionery, Ltd., a subsidiary company of J. Lyons and Co., Ltd. The arrangement will not affect the manufacture by Lyons of Chocolate Couverture nor the Maison Lyons range of chocolates and confectionery.

Wall's open new depot at Oxford

"Your company has been in the City of Oxford for 30 years, and during that time it has always been held in high repute in the eyes of both the public health authorities and the general public," said the Mayor of Oxford, Ald. A. H. Kinchin, at the official opening of the new depot of T. Wall and Sons (Ice Cream), Ltd., at Cowley on April 19.

The depot is already in full operation following the move from Tynedale Road, Oxford. The new scene of operations has a floor area of 10,400 sq. feet and covers the districts of Oxford, Bicester, Chipping Norton, Burford, Witney, Faringdon, Wantage, Harwell, Didcot, Wallingford, Abingdon and Woodstock. The cold store holds over 100,000 portions of ice-cream.

"I don't know what he's put in your engine, dear, but he's just handed me a pint of oil."

Seen at a party to announce the link-up between H. S. Whiteside and Co., Ltd., and McCormick and Co., Inc. are (left to right) *Messrs. E. T. M. Smalley, managing director of G. Street and Co., Ltd., publicity agents; H. Beck, European sales manager of the McCormick Overseas Trading Co.; N. Orr, general manager of the U.K. McCormick division; F. T. Rogers, vice-president and general manager of McCormick Overseas Trading Co.; P. Whiteside, director of H. S. Whiteside and Co., Ltd.*

Dietetics congress this month

Under the presidency of Lord Boyd Orr, world authorities on dietetics and its allied professions will foregather at Church House, Westminster, for the Third International Congress of Dietetics, held from July 10-14 inclusive. The demand for applications has already far exceeded the two previous congresses and it is estimated that the final number of delegates will be over 1,000, proving the growth of interest in the science and practice of dietetics in industry and professions generally.

New Sturge brominated oil for soft drinks

An additive for soft drinks, which ensures a uniformly cloudy appearance and prevents flotation of essential oil, has been introduced by John and E. Sturge, Ltd. It is a brominated vegetable oil, which is now available to soft drinks manufacturers at home and abroad. Sturge Brominated Oil is made from selected maize oil and is light amber in colour, has a neutral, bland, flavour and a clean odour without trace of fat or other interference. The oil is fully saturated and has not suffered bromine substitution.

Baking powder strengths standardised

Through the auspices of the Food Manufacturers' Federation, a group of the leading British baking powder manufacturers have agreed to standardise the strength of their products, and the standard decided upon, in terms of available carbon dioxide, is a gas strength, at the time of manufacture, about 50% greater than the minimum 8% required by law. Manufacturers have retained complete freedom to use their own special ingredients which enable their individual products to give the results regular customers expect.

Soft drink production for 1960

Revised figures issued by M.A.F.F. show that the total ready-to-drink equivalent soft drink production for 1960 was 415,651 gal.

Production of concentrate totalled 40,103 gal., while unconcentrated beverages totalled 215,136 gal. Busiest month was June with a ready-to-drink equivalent of 52,852 gal.

£1m. Ross Group expansion

To meet increasing demands for Ross products, a further £1,000,000 has been allocated for immediate extensions to Ross Frozen Foods production factories, plant and distribution centres. A frozen foods division, embracing all subsidiaries engaged in production and distribution, has been formed and Mr. A. S. Alexander has been appointed chairman, with Mr. J. D. Vincent as vice-chairman, Messrs. W. Vincent and W. P. Appleyard joint managing directors and Mr. W. G. Muter production director.

Forthcoming Meeting

Nutrition Society: symposium on "Nutrition and Metabolic Defects" to be held at the Laboratory of Physiology, Oxford, Saturday, July 15, 11.00 (chairman: Sir Hans Krebs, F.R.S.). Further details from Miss D. F. Hollingsworth, c/o M.A.F.F., Great Westminster House, Horseferry Road, London, S.W.1.

FOOD IN PARLIAMENT

Consumer Protection Bill talked out

A BILL which, a member protested, cut across the Foods and Drugs Acts and might affect industries such as the canning industry was "talked out" in the Commons after a five-hour debate.

This was the Consumer Protection Bill—a private member's measure intended to protect the public from hazards arising from the sale of faulty or dangerous goods.

Mr. Dudley Williams (Conservative, Torquay) claimed that it cut straight across the Foods and Drugs Acts, under which provision was made for the proper packaging and composition of goods which were sold and which might be liable to affect the health or cause the death of people. He argued that it would be wrong to pass a measure giving powers which might well supersede the powers of these earlier Acts. For example, under the Bill regulations relating to the canning industry could be issued by the Home Secretary. Canning was a complicated business, said Mr. Williams, and any regulations issued to cover it might well conflict with the earlier legislation. Remarking that it was "a very difficult industry indeed," he pointed out that goods first of all had to be in a prime state before they were even collected to go to the canning factory. During the process of canning, if the procedure was not properly carried out one might find that the goods came out in such a condition that they began to ferment inside the can. As a result gas was released, the can began to expand, a leak was caused and the whole thing went bad. Regulations to deal with that sort of danger must, he submitted, be covered by the previous comprehensive Foods and Drugs legislation.

Another Conservative M.P., Mr. John Wells (Maidstone), referred to the manufacture and sale of ice cream and sausages. There were few substances in regard to which it was more important to protect the consumer than these foodstuffs, because it was possible for them to pick up all sorts of infections. The handling of these foodstuffs on manufacturers' premises was done in the most excellent manner, and many M.P.s had in recent months had the opportunity of visiting a large works in North-West London and of seeing some wonderful new processes of food manufacture. The existing legislation on this was quite good enough, Mr. Wells contended.

Mr. Robert Edwards (Labour, Bilston), sponsor of the Bill, pointed out that there would be the closest consultation with manufacturers and consumers' organisations and also with Government departments affected before any regulations were issued.

The Bill was still under discussion when the time available for debate ran out and, as stated, it was "talked out."

Meat imports from Europe

Referring to outbreaks of foot-and-mouth disease in Western European countries, a Member asked what safeguards the Government took in connection with meat and bacon imports from Europe. Mr. Christopher Soames, Minister for Agriculture, said that imports were controlled by regulations under the Diseases of Animals Act, 1950. The safeguards ranged from a total ban on imports to conditional entry according to the circumstances of the particular country.

Report "still under examination"

The report on bread and flour by the Food Standards Committee was still under examination, Mr. Soames told M.P.s.

It was "a long and complicated report," he added, expressing the view that he should not announce any decision on it without fully considering the views of the various interests concerned. He did not expect to make any statement before Parliament's summer recess.

Erections and Extensions

Reynolds (Packaging), Ltd., are having a factory built on a 27-acre site at Becontree, Essex.

*

Popper and Co., Ltd., carton manufacturers, are extending their factory in Great Suffolk Street, London, S.E.1.

*

T. Wall and Sons (Ice Cream), Ltd., are having a depot built on a site in East Hendon Road, Sunderland, Co. Durham.

*

Kavli, Ltd., are extending their cheese processing factory on the Team Valley Trading Estate, Gateshead-on-Tyne, Co. Durham.

*

John Mackintosh and Sons, Ltd., are having a five-storey extension, two-storey canteen and welfare block, plus garage and cold storage premises erected at their existing confectionery factory at Halifax, Yorks. Total cost of this development scheme exceeds £1,000,000.

*

George Wilson and Sons (Bradford), Ltd., are having a bakery built on a site at Bolling Road, Bradford, Yorks.

*

Dixon and Close have plans in hand to construct a fruit packing factory at Whitefield Street, Crook, Co. Durham.

*

Spillers, Ltd., are having a bulk flour silo built at Tyne Quay, Newcastle-upon-Tyne.

*

J. Lyons and Co., Ltd., are extending their headquarters and food factory premises at Cadby Hall, West Kensington, London, W.14.

*

London Ice and Cold Storage Co., Ltd., are having a cold store constructed at Grimsby, Lincs., at a cost of £159,550.

*

C. M. Varley and Co., Ltd., Four Riggs Mill, Darlington, are having a four-floor grain store erected on a site in Sun Street, Darlington, Co. Durham.

*

The Golden Wonder Crisp Co., Ltd., are having a large factory built at Widnes, Lancs., for the production of potato crisps.

*

Cundell, Eve and Co., Ltd., corrugated paper box and case manufacturers, are planning to establish a factory on the Widford Industrial Estate, Chelmsford, Essex.

OVERSEAS NEWS

DOMINICAN REPUBLIC

Canadian pasta firm

Catelli Food Products, Ltd., is to open a factory in the Dominican Republic for the production of spaghetti and other types of pasta. The company will use raw materials provided by the Dominican firm, Molinos Dominicanos, which is at present supplying the Catelli factory in Canada. Machinery for the Dominican branch will be imported from Italy.

FRANCE

Potato plant

A potato plant where peeling, bulk packing and prepackaging is carried out in one large building was of particular interest to PPDA members who visited France as part of their continental tour, which took in Switzerland, Germany and Holland. The potato peeling line has a throughput of 5 tons per day and includes an ingenious SO_2 solution reservoir situated between the carborundum peelers and the final hand trimming section.

GERMANY

Potato prepacking

A visit to an establishment at Gelsenkirchen, reported to be the first potato prepackaging plant to commence operation in Germany, was included in the PPDA continental tour. The $2\frac{1}{2}$ and 5 kilo paper prepacks are sealed automatically by continuous glue-sealing machines.

Success of ANUGA

In 1960 11·2 milliard DM for imports of foodstuffs and provisions was spent in comparison with 10·7 milliard DM in 1959. The range of international products offered at the 1959 ANUGA in Cologne, at which 28 countries were officially represented, greatly contributed towards this development; 34 countries have already applied for representation by national stands at the 1961 ANUGA to be held from September 23 to October 1.

Soft drinks consumption

Milk outdistances its nearest competitor, beer, by an annual consumption of 31 gal. of milk *per capita*. Beer follows with a little over 20 gal. Consumption of coffee and tea has reached a level far above pre-war figures, but the most marked change from pre-war patterns is in the consumption of non-alcoholic beverages, such as fruit juices and carbonated soft drinks. The sale of these is more than three times as high as before the war.

HOLLAND

PPDA visit

Of particular interest at Kruiningen was the Swedish Precido Weigher Bagger which has a throughput of 600 × 5 kilo packs per hr. from one bagging head. At Hoofdorp near Amsterdam members visited a thriving business based on the prepackaging of shredded vegetables for sale in Dutch self-service stores and supermarkets.

HUNGARY

Food of the future?

Scientists at the Academy of Science's Institute of Biology at Tihany are working on research which might produce food for the space navigators of the future. They are studying the mass breeding of algæ, which have three important attributes, they breed fast and they turn inorganic matter into organic matter under the influence of sunshine, producing fats, albumin and carbohydrates. They also consume poisonous carbon dioxide and give off oxygen. A special committee, formed because of encouraging results from experiments so far, is at present working on plans for an experimental plant to produce algæ in quantity for practical use.

ISRAEL

Plastic covers hasten ripening

Melons grown under plastic covers, produced by the agricultural settlement's plastics factory, are reported to be ripe and ready for export fully three months earlier than usual.

ITALY

Packaging take-over

The recently-formed joint subsidiary of Albert E. Reed and Co., Ltd., and La Centrale Finanziaria Generale S.p.A. of Milan, Sicar S.p.A., has acquired the majority of the shares of the Rexim-Bugnone S.p.A. packaging business in Turin, which manufactures a wide range of cartons, paper bags, sachets, foil, plastic and flexible packaging.

(*Continued on page* 312)

Part of the alga research laboratory at the Tihany Institute in Hungary. Dr. Lajos Felföldy (*l.*), scientific head of the botanical department is talking to Ernö Szabó, research chemist, among the breeding flasks.

COAL-properly used-is the cheapest fuel for the Food industry

Coking stokers feed coal continuously, quietly and invisibly into this modern boiler.

Over the past few years a minor revolution has taken place in the eating habits of the British public. Housewives have learned that manufactured and processed foods have many special virtues—not the least of which is absolute cleanness—that simplify her daily task of feeding the family. In addition they give her an infinite variety of good and appetising meals regardless of season. But this tremendous expansion of the food market has brought its own problems to the industry. Increasing competition within this market means that every possible economy must be practised if profits are to be increased, and markets expanded.

ECONOMY BEGINS IN THE BOILERHOUSE

There are still many managements that handicap their finances with outdated firing plant. To modernise other machinery, while 'making-do' with inefficient boiler plant is to throw good money down the drain. Modern coal-burning installations can be so efficient that they will more than pay for themselves in a remarkably short time. They are, without question, the *first* essential.

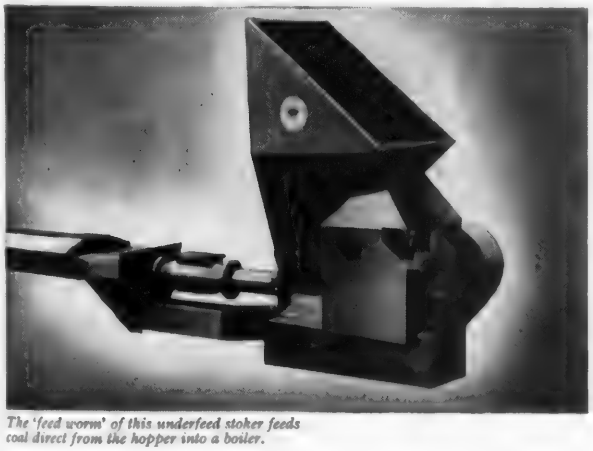
COAL IS THE RELIABLE FUEL

One question for any long-term planning is obvious: can supplies of coal be guaranteed? The answer is yes—without qualification. The mining industry—*Britain's largest single industry* is becoming increasingly efficient; its equipment is the best of its kind. And British coalfields contain enough coal to supply every industrial demand for centuries to come.

COAL IS CLEANER, HOTTER

Modern grading and washing methods ensure that coal is the most efficient and consistent fuel for every type of boiler—the ideal fuel for every section of the food industry.

But to obtain the maximum heat at the lowest cost, coal should be mechanically stoked. A mechanical stoker automatically feeds the right amount of coal for the boiler load, even when the load is varying; it burns coal at optimum efficiency all the time without the emission of smoke (thus complying with the regulations in Smoke Control Areas); and it virtually replaces the human element in boiler operation. There are many types of mechanical stokers, of which the most commonly used are the Chain Grate stoker, the Coking stoker, the Underfeed stoker and the Sprinkler stoker. Standard models are available for all sizes of boiler.



The 'feed worm' of this underfeed stoker feeds coal direct from the hopper into a boiler.

OVER 80% OF BRITISH INDUSTRY USES COAL

The National Coal Board is determined that COAL shall continue to be plentiful, shall continue to keep our industrial power both dominant and progressive. You can depend upon COAL: its sources and supply are in our *own* hands—are free from fluctuating foreign policies and stratagems. Endless research by scientists and chemists working in the laboratories of the N.C.B. will ensure that coal will be increasingly profitable for its users.

DELIVERY—ON THE DOT —ON THE SPOT

The delivery of Industrial coal is today organised and completely reliable. Leading coal merchants have completely overhauled delivery and storage systems and are fully equipped to make sure that you get the right grade of coal when you want it and where you want it.

Furthermore, a completely mechanised handling system will transport coal from bunker to furnace without any manual labour at all.

AND—WHEN YOU NEED IT— A NATION-WIDE FREE SERVICE

The vast resources of the National Coal Board are no further away than your telephone. At a flick of your finger, you can call upon one of the most comprehensive and efficient technical services in the world. No problem is too small or too big. You may want advice on coal quality, coal storage, coal-burning appliances or even on the siting of a boilerhouse. Whatever it is, a 'phone call or letter either to your coal supplier or to the Regional office of the National Coal Board will bring an unbiased and authoritative answer to your problem.

FINANCE PLAN FOR INDUSTRY

No deposit, repayments spread over five years, and low interest charges that can be set against tax, full investment and other capital allowances—these are the terms available to the manufacturer or businessman who wants to install modern coal-burning equipment without touching his capital resources.

Make use of the National Coal Board Industrial Finance Plan. The loans are made by Forward Trust Limited, a member of the Midland Bank Group. A 'phone call or a letter to the Regional office of the National Coal Board will bring you full details.

SOLID FUEL—more heat at less cost—and it's British

PROGRESSIVE INDUSTRY IS GOING FORWARD ON COAL

ISSUED BY THE NATIONAL COAL BOARD

OBITER DICTA

● The world's greatest eaters have always been men.—*Press release.*

● The lunch also trod new ground with a sit-down meal.—*From a report quoted in Daily Telegraph.*

● Cheese will stay longer on shop and warehouse shelves before it starts to walk about, if automation is used in processing it.—*Press release.*

● Mr. Leach has a very simple approach to soft ice cream machinery—his own product: "Why do it the hard way?" he says.—*Press handout.*

● "Many foods would be hopeless if they were not cooked in wine or served in wine." This was stated the other day in support of an application for a drinking licence.—*Daily Telegraph.*

● Quite soon I expect to have a boy who knows all about osmotic balances in an egg, but did not know that the egg had been laid by a hen.—*Field Centre warden, quoted in Daily Telegraph.*

● At this time of year a young man's fancy turns to love we are told and a young woman's fancy usually turns to thoughts of dieting after rich food at Christmas to get trim for those summer swimsuits.—*Press handout.*

● And lastly, atmosphere is needed [in the supermarket]. It is secured by such means as strewing the floor with a little coffee and sugar which, when bruised, gives the familiar grocery smell.—*Financial Times.*

● Around the turn of the century, an insignificant amount of food and beverages was packed in small containers. Pickles, for example, didn't come in jars. Instead, the grocer dipped his hand into the barrel. One benefit—the only "litter problem" then concerned the family cat."—*Food Processing.*

● A cookery expert had an experience dreaded by all who demonstrate before an audience, namely the utter failure of the demonstration. When showing a group of housewives how to make a fondue from cheese, wine, etc., the result had turned out as a grey solid plastic mass resembling plasticine. Samples of the wine and cheese were brought to us in order to discover just where the fault lay. Unfortunately, we had to exonerate the ingredients and could only blame the gremlin who sits on the shoulders of all demonstrators.—*City of Birmingham Public Analyst.*

JAMAICA

Record sugar crop forecast

The latest estimate of the 1961 sugar production is 454,700 tons and indications are that this might be a record year.

MEXICO

Milk cattle

Ganaderes de Jalisco, S.A., an association of cattle men, plans to build several plants and laboratories at Guadalajara. Planned projects include a milk pasteurisation plant with facilities to manufacture cream, butter and cheese.

NEW GUINEA

Survey of coffee industry

The quantity of coffee production is as yet relatively small, but it is increasing. Production rose from less than 1,000 tons of raw coffee beans in 1959 to approximately 2,000 tons in 1960 and the estimated crop for 1961 is 3,000. Almost all of this coffee is the arabica variety.

SIERRA LEONE

Tuna industry

Following the recent discovery of shoals of tuna in the Atlantic Ocean, outside territorial waters but within easy reach of Freetown, exploratory surveys undertaken by American and Japanese tuna clippers have resulted in an American firm, the Van Camp Sea Food Co., buying tuna fish from Japanese and Spanish clippers in Freetown. The landing storage is carried out by an Italian firm at Kissy, for ultimate shipment to the U.S.A. Arrangements are being made for a cannery to be set up in Freetown.

SOUTH AFRICA

Vegetable oil extraction

A manufacturing industry for the extraction of vegetable oils has been established in South Africa, starting with the crushing of imported oil-seeds from India and other tropical areas. Groundnuts are now grown in most parts of the Transvaal as well as in the Orange Free State and in parts of Natal and the Northern Cape.

SWEDEN

Polyethylene plant

Union Carbide Corp. and Superfosfat Fabriks Aktiebolag of Stockholm, usually called Fosfatbolaget, are participating in a joint venture to construct a 35 million lb. per year polyethylene plant, located in the vicinity of Gothenburg.

TANGANYIKA

Tea production

Production of made tea was 2·7 million lb. in the first quarter of 1961, the same as last year. Production in the Usambaras, where the rainfall has been good, was 56% above the first quarter of 1960, but this was offset by a decline in the Southern Highlands, where rainfall has been disappointing.

U.S.A.

Processing facilities extended

Florida Citrus Canners Co-operative is enlarging and improving its processing facilities in an 18-month programme starting from May.

New Campbell soup plant

The Campbell Soup Co. are to build a new food processing plant in Texas, bringing the total of Campbell processing facilities in the world to 22. Equipped for the initial production of soup, bean and spaghetti products, the plant will employ about 750 people at first, increasing to about 1,200.

Meat, Milk and Fruit Information

THREE books* published by the Commonwealth Economic Committee have appeared, reviewing the production and consumption of Meat, Dairy Produce and Fruit. The book dealing with meat gives full information on beef, live cattle, mutton and lamb, live sheep, pig-meat, bacon and hams, pork, live pigs, canned meat, offals and poultry meat. *Dairy Produce 1959* contains facts on butter, cheese, condensed milk, milk powder, casein, eggs, egg products, margarine and dairy herds. The review of fruit concerns apples, pears, plums, cherries, peaches, apricots, grapes, bananas and citrus fruits, as well as including sections on canned fruits, fruit juices, dried fruits and wine. All three books give many tables illustrating the facts and appendices on government measures affecting import duties and controls in certain countries are included.

* *Meat*, 1959. H.M.S.O., London, 1960. Pp. 120. Price 7s. 6d. nett
Dairy Produce, 1959. H.M.S.O., London, 1960. Pp. 133. Price 7s. 6d. nett.
Fruit, 1959. H.M.S.O., London, 1960 Pp. 203. Price 10s. nett.

PEOPLE

MR. R. CARROLL has been appointed sales manager, southern division of Campbell's Soups, Ltd. MR. R. L. HARRIS is now sales manager, central division, and MR. E. J. FENNELL has become assistant to the sales manager. MR. P. SMITH has been appointed manager, south-western district, MR. R. J. HADDEN has become manager, eastern district, and MR. P. H. BURNS is now general sales supervisor.

*

MR. W. H. T. COOK, joint managing director of Spratt's Patent, Ltd., has been elected chairman of the National Association of Dog Biscuit Manufacturers for the current year.

*

MR. P. E. BALLARD, chief administrative director of Bramigk and Co., Ltd., has retired after over 38 years' active service.

*

MR. TORSTEN BERG has been appointed technical director of A. Johnson and Co. (London), Ltd., but will continue to be responsible for the company's sale of food and chemical plant.

*

DR. H. D. CREMER, head of a German nutrition institute, has joined the staff of F.A.O. as chief of the Nutrition Division's applied nutrition branch.

*

MR. J. E. FLACK has been appointed site personnel manager at Wall's Meat Products factory in Hayes. He replaces MR. O. P. CASEY, who has returned to Ireland.

*

MR. J. B. WILKINSON has been appointed technical director of Williams (Hounslow), Ltd. He is succeeded as works manager by Mr. A. G. Hopkins.

*

MR. A. CLAPP has been appointed secretary of the British Baking Industries Research Association in succession to MR. S. T. KILLICK.

Mr. J. Wilkinson

Mr. A. Clapp

Mr. R. Carroll

Mr. R. L. Harris

Mr. E. J. Fennell

Mr. P. Smith

MR. J. K. BENSON, a director of York Shipley, Ltd., has retired after 31 years of active service with the company. He joined the company as a chief accountant in 1929, was promoted company secretary in 1932, and appointed to the board in 1938. Since then, under a succession of managing directors, he has been responsible for the financial affairs of the company.

*

MR. H. GEHMAN has been promoted to director of research for the laboratories of Corn Products Co. in America.

Mr. R. J. Hadden

Mr. P. H. Burns

MR. K. J. BUSH has been appointed assistant sales manager, mechanical thermometer division of Cambridge Instrument Co., Ltd. MR. W. C. ORFORD, MR. S. V. J. CRUMP and MR. W. A. HALL are now assistant resident engineers at the company's branch offices in Nottingham, Bristol and Manchester, respectively.

*

MR. HAYDN JOHN has been appointed chief chemist of the British Hydrological Corporation.

*

DR. H. W. VAHLTEICH, vice-president for research and quality control of Best Foods Division, Corn Products Co., has retired. DR. D. MELNICK has been named director of research under DR. W. E. BRINKER, director of basic and applied research for the company.

*

MR. D. C. M. SALT has been appointed to the board of Monsanto Chemicals, Ltd.

MR. N. S. HALL, formerly sales manager for home trade of British Sidac, Ltd., has been appointed general sales manager with MR. T. KELLY and MR. W. WALKER as chief assistants for home and export sales respectively. MR. R. V. MOTT, hitherto senior sales representative, has been appointed London sales manager and MR. F. J. WESTWOOD is promoted to senior sales representative.

*

MR. R. GAINES has retired after 44 years' service with the A.P.V. Co., Ltd., having joined the company as a junior clerk and rising to be manager of a department.

*

MR. C. WHITE has been appointed export manager of Batchelors Foods, Ltd.

*

MR. JOHN M. CANSICK has been appointed group purchasing controller of the Express Dairy Company.

Technical Books

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New Companies

Woolley and Cross, Ltd. (686867.) Peads and Barnetts Farm, Frilford, Berks. To carry on bus. of pig farmers, etc.

Southgate Bakeries, Ltd. (686902.) Guildhall Chambers, High Street, Exeter. To take over bus. of a baker and confectioner cd. on at 60, South Street, Exeter, by Frank Dodge, etc.

G. W. Holt, Ltd. (686951.) To carry on bus. of salmon curers and slicers, etc.

Kerr's Minerals, Ltd. (687188.) 44, Barrow Street, St. Helens. Mineral water mnfrs. Dirs.: A. Fairhurst; D. Fairhurst.

Sykes (Soft Drinks), Ltd. (687534.) Salterfern Lane, Toll Bar, Rythorpe, Sunderland. Soft drink mnfrs. and botanical brewers. Subs.: W. L. Cockerill; W. P. Lockstone.

Tom H. Allen and Sons (Kendal), Ltd. (887540.) White Hart Yard, Kendal. Mnfrs. of and dlrs. in confectionery, chocolates, etc. Dirs.: Mrs. E. M. Allen; K. T. Allen; J. R. Allen.

Valley Pride Products, Ltd. (687545.) 14, Moorgate, London, E.C.2. Processors, preservers, canners, bottlers, dlrs. in meat, fish, etc. Dirs.: K. D. Hutton; S. Suzman.

J. Mayne, Ltd. (687568.) Holborn House, 113, High Holborn, London, W.C.1. Mnfrs. of and dlrs. in confectionery, chocolates, sweets, cooked and prepared foods, etc. Dirs.: J. Mayne; W. J. Mayne.

Horleston (Soft Freeze), Ltd. (688677.) 296, Broad Lane, Coventry. Mnfrs. of and dlrs. in ice cream, etc. Dirs.: L. S. Horleston; Mrs. B. R. S. Horleston.

M. Cotton (Tredegar), Ltd. (688686.) 95, Commercial Street, Tredegar, Monmouthshire. Mnfrs. of and dlrs. in confectionery, etc. Dirs.: Margaret Cotton; J. H. Cotton.

W. Simons and Son (Food Products), Ltd. (687856.) 50, Swedenborg Square, London, E.C.1. Dirs.: W. Simons; H. Simons; I. Dawson.

Produce Packers and Merchants, Ltd. (688955.) 3, The Shrubbery, Upminster, Essex. Packers, processors and dlrs. in fruit and veg. Dirs.: I. R. Hillman; A. F. Southwell.

E. R. Glynn Bros., Ltd. (689015.) 6, Hanover Square, London, W.1. Mnfrs. of and dlrs. in sausage casings, etc. Dirs.: Else Rado; L. A. Ward.

Monanda Foods (Belfast), Ltd. (689172.) 48, Atlantic Chambers, 7, Brazennose Street, Manchester, 2. Foodstuff mnfrs. and dlrs. Dirs.: M. Klapish; Mrs. Klapish; P. Fletcher.

Bevella, Ltd. (689180.) 61, Fairview Avenue, Gillingham, Kent. Mnfrs. of and dlrs. in foodstuffs, etc. Subs.: Mrs. D. M. Graeme; P. G. Graeme.

Middlesex Aerosols, Ltd. (689900.) 3, Gray's Inn Place, London, W.C.1. Mnfrs. of and dlrs. in aerosols, packages and containers. Subs.: M. F. Flint; H. Watts.

Ind Coope Tetley, Ltd. (689729.) 18, Austin Friars, London, E.C.2. Brewers, maltsters, etc. Subs.: P. Clarke; J. D. Simon.

O. Bartholdi and Son, Ltd. (690323.) 4, Charlotte Street, London, W.1. Mnfrs. of and dlrs. in sausages, brawns, baked and cooked meats, etc. Dirs.: G. J. O. Bartholdi; Mrs. Bartholdi.

White Cottell and Co., Ltd. (690421.) Castlefields Avenue, Rastrick, Brighouse. Sauce mnfrs. Subs.: M. Foster; F. A. Schippers.

Tynepax, Ltd. (690475.) 39, Dorney Street, Gateshead, 8. Processors, packers and distributors of fruit, veg., etc. Dirs.: R. A. Reilley and Mrs. Reilley.

W. and H. Marriage and Sons, Ltd. (690479.) Chelmer Mills, Chelsford. Flour and provender millers. Dirs.: S. P. Marriage; S. D. Marriage; H. P. Marriage; S. Marriage.

Grannie Green, Ltd. (690495.) Pelham Street, Wolverhampton. Mnfrs. of and dlrs. in chocolates, etc. Dirs.: S. C. Green; L. Rowley; W. J. Formby.

Elfrand, Ltd. (690766.) 61, Fairfield Avenue, Gillingham, Kent. Mnfrs. of and dlrs. in foodstuffs and food products. Subs.: D. M. Graeme; P. G. Graeme.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

867,745. H. A. FAERBER: Confectionery-moulding machine.

867,870. BARRY-WEHMILLER MACHINERY CO., LTD.: Apparatus for the pasteurisation or sterilisation of liquids contained in drums.

867,885. F. G. ROBINSON: Screw caps for containers.

867,897. S.E.B. ESTABLISHMENT: Sealing caps for bottles or like containers.

868,045. SEYMOUR FOODS, INC.: Dried egg product and method of preparation

868,084. HEDLEY AND CO., LTD.: Apparatus for filling containers, such as bottles, jars, cans, etc.

868,090. V. JOWETT: Case or container for baked goods and confectionery.

868,182. W. H. LAND: Tube-like container for food.

868,183. O. WILLRICH: Machine for rolling out dough.

868,364. NEW MERTON BOARD MILLS, LTD.: Drums lined with polythene or like material.

868,383. METAL CONTAINERS, LTD.: Containers and lids therefor.

868,429. CATCHPOLE ENGINEERING CO., LTD., and E. DONALDSON: Topping knives as used in beet-topping machines.

868,523. ROBERT MOSS, LTD.: Container closures.

868,583. ROSE BROS. (GAINSBOROUGH), LTD.: Packaging apparatus.

868,591. A. and L. J. LARMUTH: Wrapping machines.

868,716. ROSE CONTAINERS, LTD.: Waxed cartons.

868,621. DISTILLERS CO., LTD.: Yeast.

868,750. F. H. GRAVES and P. H. WATTS: Container closures.

868,782. R. G. T. BAADER: Dressing of fish.

868,794. ROSE BROS. (GAINSBOROUGH), LTD.: Packaging machines.

868,823. HENRY SIMON, LTD., and RICHARDSON SCALE CO.: Automatic weighing means.

869,651. A. F. JONES: Egg-packing device.

869,671. AMERICAN FLANGE AND MANUFACTURING CO., INC.: Method for forming containers and closures therefor.

869,693. AMERICAN CYANAMID CO.: Preservation of meat and the like.

869,721. SAARLANDISCHE KRONENKORKFABRIK NIKOLAUS MORLO G.M.B.H.: Closure device for bottles and like containers.

869,755. W. R. GRACE AND CO.: Method of making vacuum package.

869,782. MANWOOD ENGINEERING CO., LTD.: Handles for containers.

870,031. AJINOMOTO CO., INC.: Process for recovering glutamic acid from fermentation broth.

869,965. J. CHEVALLIER: Cap-sealing machines for bottles or jars.

869,948. AJINOMOTO CO., INC.: Process for producing glutamic acid from fermentation broth.

870,752. W. J. WEARS: Cover suitable for a beer barrel.

870,832. UNGA, LTD.: Treatment of groundnuts.

870,926. NIPPON SUISAN KABUSHIKI KAISHA: Preservation of canned crab.

870,968. L. P. MORRIS: Machine for collecting apples or pears from the ground.

870,984. MAASVEEM N.V.: Method for packing dried and re-soaked fruit.

871,044. CONTINENTAL CAN CO., INC.: Wrapping machines.

871,070. J. GLASER: Packing box, particularly for eggs.

871,166. B. S. SCOTLAND: Process of making macaroni product.

871,255. R. P. C. CARCASSONE-LEDUC: Method for producing flavoured cereal.

871,456. I.C.I., LTD.: Prevention of caking of common salt.

871,467. J. LYONS AND CO., LTD.: Cartons.

871,468. BURGESS ENGINEERING, STOKE-ON-TRENT, LTD.: Method of and means for cleaning dried fruit.

871,478. COMMONWEALTH ENGINEERING CO. OF OHIO: Dry pudding mix comprising carboxymethyl dextran.

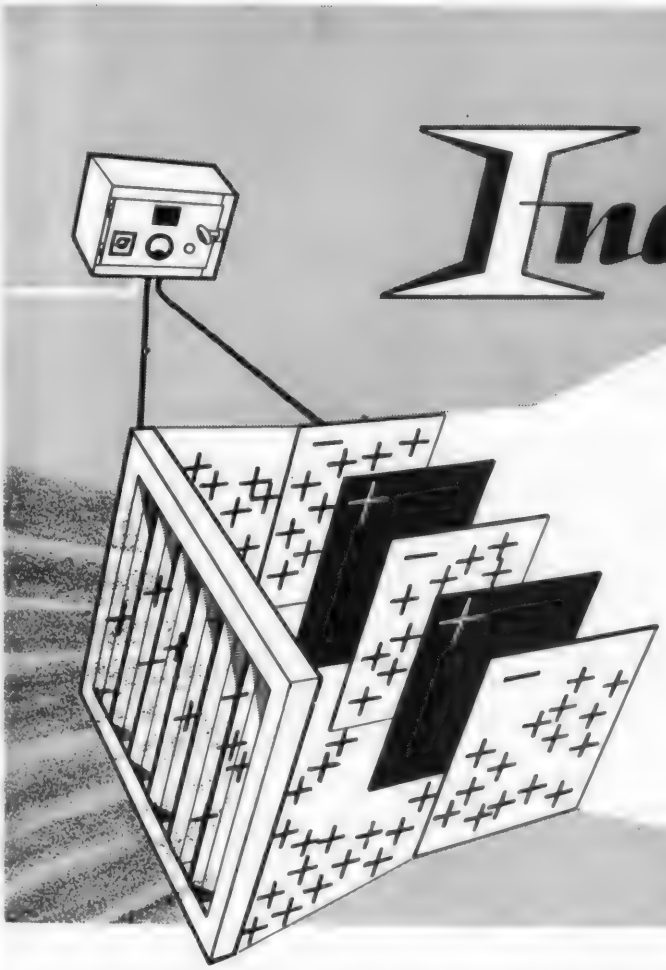
871,602. H. SMITH, LTD.: Beer or like barrels.

871,608. G. SALTER AND CO., LTD.: Packaging containers.

871,638. H. C. OPPEL: Beet harvester.

New patents are from the Journal of Patents. Permission to publish has been given by the Controller of Her Majesty's Stationery Office. The publication is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

Industrion



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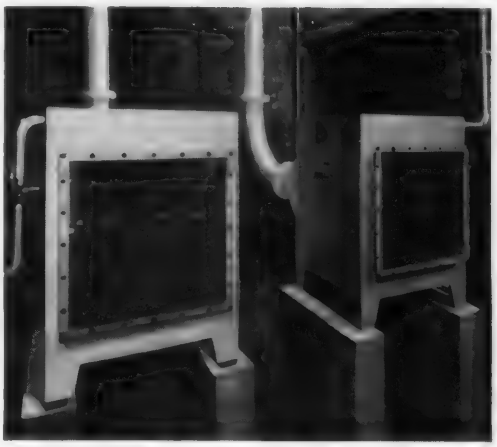

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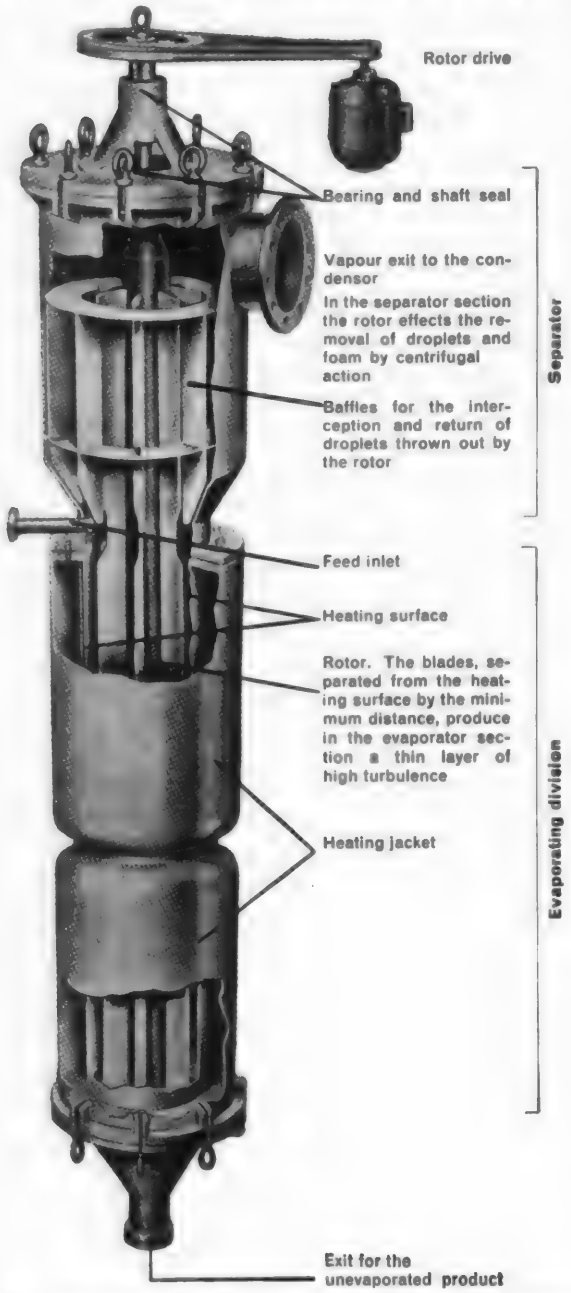
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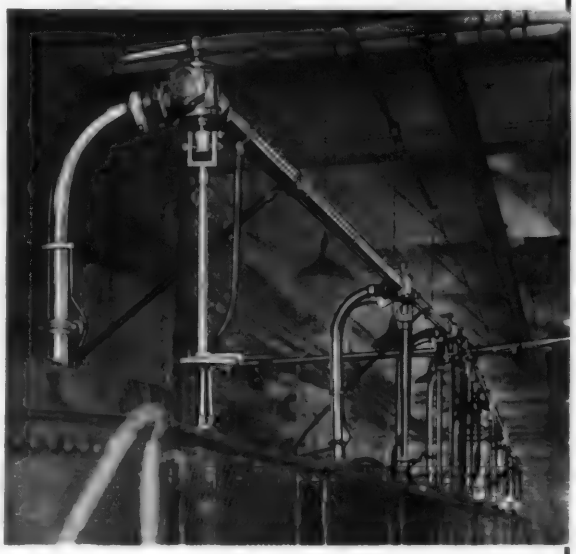

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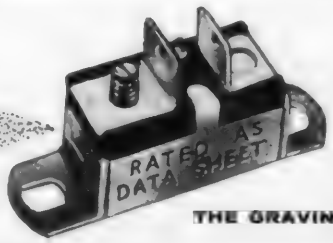

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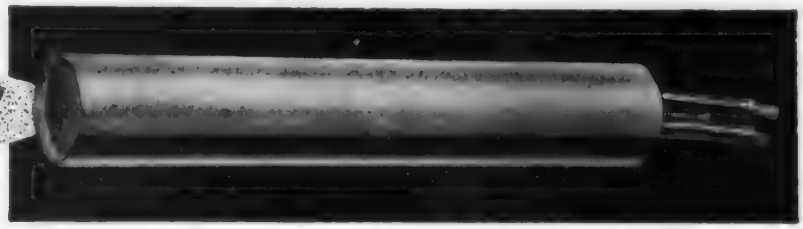

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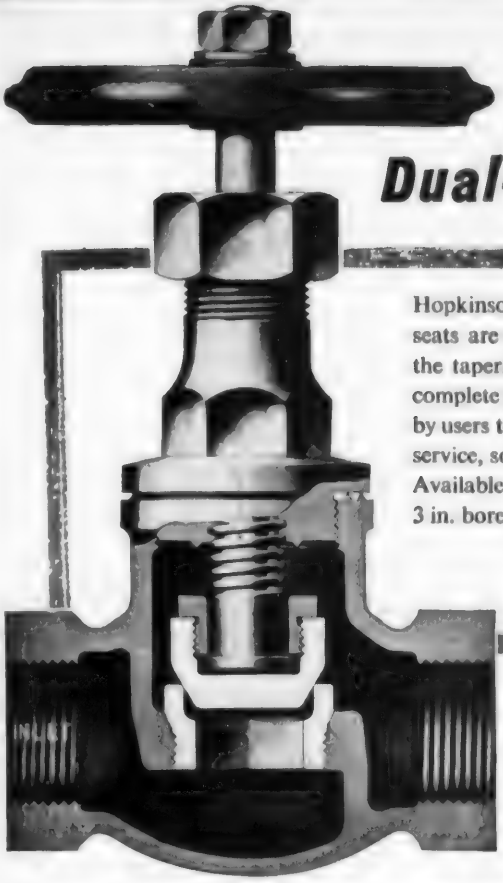

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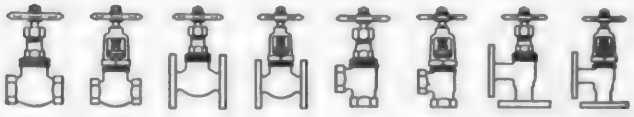

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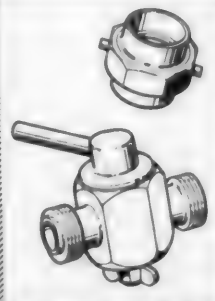

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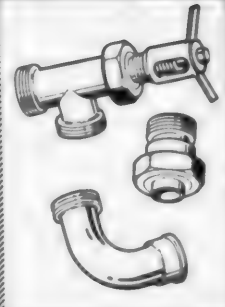

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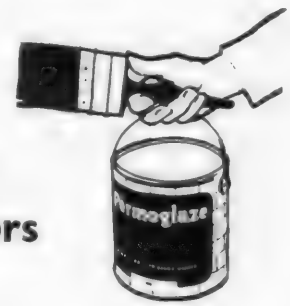

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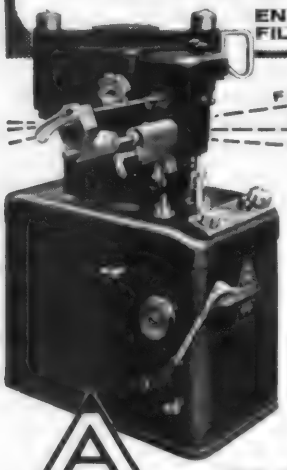

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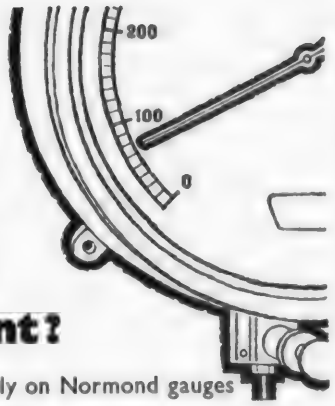

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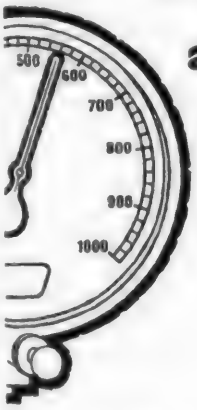

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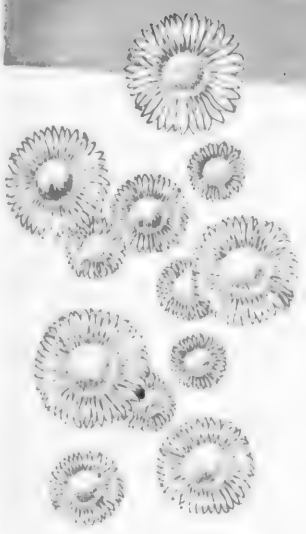

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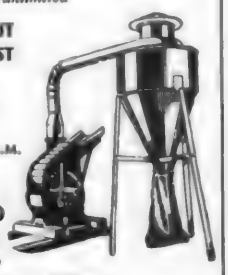

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Ref. B.287. British. Male. Married. Age 52. 6 yrs. Apprentice, engr. 3 yrs. Asst. Manager, engrs. 20 yrs. Supervisor, telephone & elec. engrs. At present Group Supervisor, telephone & elec. engrs. Exper. dwg., Planning, Ratefixing, stores control, fitting, tool making, power presses, spot & arc welding, milling, capstan lathes, sheet metal work, jig & fixture design. Seeks post as **SUPERVISOR (ENGG.).** U.K. £800 p.a.

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(continued overleaf)

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Ref. B.324. British. Male. Married. Age 30. B.Sc.(Physics, Chem. & Maths.). 6 mnths. Works Manager's Asst., plywood mnfrs. 4½ yrs. Research Chemist, atomic energy. 2 yrs. Process Devpt. Chemist/Engr., electrical engrs. At present Senr. Project Engr., heavy capital plant engg. Seeks post as **TECH. EXECUTIVE (CHEMIST/ENGR.).** London or 25 mile radius Slough pref. £1,800 p.a.

Ref. B.325. British. Male. Married. Age 46. H.N.C. (Bldg.). A.M. Purchasing Officers Assoc. 1 yr. Asst. in Prod. Planning & 5 yrs. Clerical Asst. in Stores Factory & Administrative Branches, engrs. At present Chief Buyer/Stores Controller, property owners, developers & builders. Seeks post as **PURCHASING OFFICER.** London. £1,500 p.a.

Ref. B.326. British. Male. Married. Age 43. Technical education & cert. in pattern making. 12 yrs. Representative, embroidery mnfrs. 2 yrs. Representative, special process mnfrs. of plastic sheeting. 1½ yrs. Representative, cigarette m/c mnfrs. At present Representative, watch-strap mnfrs. Car owner. Seeks post as Representative. Home Counties—not London. £1,500 p.a.

Ref. B.330. British. Male. Married. Age 25. O.N.C. & H.N.C. Elec. Engg. 5 yrs. Apprenticeship (incldg. design work), instrumentation. At present Instrument Artificer, non ferrous metals, engaged on maintenance of temperature, pressure & flow instruments & automatic control processes. Seeks post as Instrument Technician. Devon, Dorset or Hampshire. £850/£950 p.a.

Ref. B.331. British. Male. Married. Age 31. 5 yrs. Apprentice, canning & quick freezing. 3 yrs. Asst. Manager & 2 yrs. Prod. Manager & Deputy Factory Manager, fruit & vegetable quick freezing & canning. 3 yrs. Prod. Manager (canning dept.), fruit & vegetable canning preserve mnfrs. At present Factory Manager, fruit and vegetable canning. Seeks post as **PROD. OR FACTORY MANAGER.** U.K.—not London. £1,500 p.a. approx, but right post more important than salary.

Ref. B.332. British. Male. Single. Age 36. Education to H.N.C. standard. 3 yrs. Inspector, & 6 yrs. Estimating/Planning, aircraft mnfrs. 2 yrs. Chief D/man, 3 yrs. Plant Loading Layout Engr. & 3 yrs. Chief Estimator, mech/electronic engrs. At present Chief Estimator, design, devpt. mnfrs. data processing/computing equipt. Specialised knowledge design devpt. organisation, estimating, programming, cost/schedule monitoring & control systems, budgeting & of contractual law. Seeks **MANAGEMENT POST**—Estimating/Planning/Works/Budgetary.

Ref. B.333. British. Male. Married. Age 39. O.N.C. Telecommunications. 2 yrs. of C. & G. Radio Communications. 3 yrs. Apprentice, telecommunications. 4 yrs. Lab. Asst. & 5 yrs. Commissioning Engr., remote control. 8½ yrs. Sales/System Planning Engr./Contract Engr./Tech. Sales Engr., instrumentation & control. At present employed in Tech. Sales Exploration Group, instrumentation & control engrs. Seeks post in **TECH. SALES AS MANAGER, ASST. OR SENR. ENGR.,** instrumentation & control systems. London or S. England. £1,500 p.a.

Ref. B.335. British. Male. Married. Age 40. 4 yrs. Apprentice, motor engrs. 2 yrs. Maintenance Engr., R.N. armament depot. 8 yrs. Senr. Engr. Officer, shipping company. 2 yrs. Asst. Superintendent Engr., transport company. At present Asst. Road Tanker Maintenance Manager, fuel oil company—responsible for repairs & maintenance of very large fleet of road tankers & cars. Seeks **MANAGEMENT POST.** U.K. or abroad.

Ref. B. 336. British. Male. Age 48. B.Sc., A.R.I.C., D.P.I. 13 yrs. Devpt. Chemist, coal tar products. 6 yrs. Deputy to Chief Chemist, plastics. 2½ yrs. Devpt. Chemist, paint mnfr. 5 yrs. P.A. to Tech. Director, plastics, glass fibre mnfr. 4 yrs. P.A. to Tech. Director, particle board. At present Senr. Chemist, plant for mnfr. of particle board. Seeks **INDUSTL. ADMINISTRATION POST,** pref. in plastics. London. £1,600 p.a. min.

Ref. B.337. British. Male. Married. Age 47. B.Sc. (1st Class Hons.), Ph.D., A.R.I.C. 2 yrs. Research Chemist, metal refining, 6 yrs. Research Chemist, research association. 7 yrs. Senr. Research Chemist, domestic appliance mnfr. At present Asst. Chief Chemist, light engg., metal finishing. Has held Hon. Secretaryship of Tech. Institute. Seeks post as **CHIEF CHEMIST OR TECH. MANAGER.** London or S.E. England. £2,000 p.a.

Ref. B.338. British. Male. Married. Age 38. 1st Class Diploma, genl. engg. M.Inst. Packaging. Studying for Cert. of Inst. of Works Management. 3 yrs. Junr. D/man, packaging m/cs for cigarette industry. 5 yrs. Chief Tool D/man, hydraulics—light engg. 3 yrs. Chief D/man, special purpose m/cs—jigs, fixtures, moulds & dies. 4 yrs. Prod. Manager, packaging m/cs & genl. engg. At present Works Engineer, mnfg. chemists—pharmaceuticals, household & veterinary products, bottling & packaging. Seeks post as **WORKS MANAGER/WORKS ENGR.** London, S. England or S. Wales. £1,500/£2,000 p.a.

Ref. B.339. British. Male. Single. Age 52. M.I.Mech.E., M.I.E.E., A.M.I.C.E., A.M.I.Chem. E., M.Inst.Fuel, M.B.I.Man., certificates in gas mnfr. & supply. 5 yrs. Engg. Apprentice & 7 yrs. P.A. to Chief Engr. & Genl. Manager, chocolate mnfr. 4 yrs. Asst. Works Superintendent, gas company. 2 yrs. Asst. Manager (Engg.), acid & explosive mnfr. 3 yrs. Prod. Engr., experimental explosive plant & filling. 1 yr. Deputy General Manager & Prod. Engr., prod. of mercuric oxide dry cells. 9 yrs. Asst. Chief Engr., tobacco, paper, board & container mnfr. & saw mills. 5 yrs. Chief Engr., china clay & minerals prod. Seeks post as **ENGINEER OR MANAGER.** £2,500 p.a. min.

Ref. B.341. Indian. Male. Married. Age 25. **RESIDENT U.K.** B.Sc.(Chem. Physics & Maths). 4 yrs. Senr. Asst./Chemist, India. At present Chemist, with London analytical company. Exper. analysis minerals, metals & alloys, organic & other routine analysis. Seeks post as **CHEMIST.** London. £900 p.a.

Ref. B.342. British. Male. Married. Age 32. O.N.C. (Mech.), A.M.I.E.D. 3 yrs. Junr. D/man, jig & tool mnfrs. 1½ yrs, Junr. D/man, plastics m/cy & mould mnfrs. 3 yrs. D/man, light mech. & electro-mech. engrs. 1½ yrs. Senr. Jig & Tool D/man, jig & tool mnfrs. 1½ yrs. Senr. D/man, mech. handling. 1½ yrs. Senr. D/man, research & devpt. 6 mnths. Asst. Chief D/man, press tool mnfrs. 1½ yrs. Senr. Design D/man, mining m/cy & mech. handling. At present Senr. Design D/man (devpt), instrumentation & control engrs. Seeks post **CHIEF D/MAN/DESIGNER DEVPT. ENGR.** U.K. £1,100 p.a. min.

Ref. B.343. British. Male. Married. Age 31. H.N.C. (Elect.). 5 yrs. Laboratory Technician, technical college. 4 yrs. Mech. Design D/man, medium m/cy. At present Electrical Engr., photocopying materials (paper coating). Seeks post as **ELECTRICAL ENGINEER, OR CLOSELY ALLIED WITH ELEC. WORK.** London. £1,100 p.a.

Ref. B.344. British. Male. Married. Age 51. M. of Sales Managers Assoc. 5 yrs. Pupil, railway signal & brake mnfrs. & 2 yrs. Trainee. 9 yrs. Rly. Signal & Communications Inspector, foreign govt. 12½ yrs. Post Office Telephone Inspector/District Engr./senr. Executive Engr., foreign govt. 4½ yrs. Sales Management of telephone & cable mnfrs. 1½ yrs. Genl. Sales Manager, telephone equip mnfrs. At present engaged on management of special projects with telephone cable mnfrs. Seeks post as **SALES MANAGER,** U.K. £1,750/£2,250 p.a.

Ref. B.345. British. Male. Married. Age 44. 3 yrs. Works Foreman, aeronautical engrs. 2 yrs. Press Shop Foreman, lamination mnfrs. 3½ yrs. Chief Inspector, scientific instruments. At present Asst. Works Manager, fireproof materials. Seeks post as **WORKS MANAGER.** London. £1,100 p.a.

Ref. B.413. Polish. Male. Single. Age 26. **RESIDENT U.K.** At present Student in final yr. of B.Sc. Chem. Eng. Course. Knowledge Polish, German & Russian. Seeks post as **ASST. CHEM. ENGR.** U.K.—pref. London. £900 p.a. approx.

Ref. B.414. British. Male. Married. Age 32. 1st Class C. & G. M/c Shop Engg. (Inter.). C. & G. Metalwork Teachers Cert. A.M. Inst. of Inc. Work Study Technologists. Reg. Student (Qualified) Soc. of Commercial Accountants, 3 yrs. Apprentice Mech. Engr., consulting engrs. 3 yrs. Genl. Machinist, elec. & mech. engrs. 2 yrs. Senr. Work Study Engr., pottery mnfrs. 1 yr. Planning Engr., engrs. 7 yrs. Works Accountant, rubber mnfrs. Seeks post as **CHIEF WORK STUDY ENGR. OR PROD. MANAGER.** U.K.—pref. Grimsby area—not London. £1,250 p.a. min.

Ref. B.415. British. Male. Single. Age 31. 2nd Class M.O.T. Cert. 5 yrs. Apprentice, shipbuilders & engrs. 6 yrs. Engr., shipowners. 1 yr. Test & Commissioning Engr., engrs. At present Test & Commissioning Engr., Chem. plant & pipework engrs. Seeks post as **SALES, COMMISSIONING OR MANAGEMENT ENGR.** London or Abroad (pref. Scandinavia or Brazil).

Ref. B.416. Indian Citizen, permanent **RESIDENT U.K.** Male. Married. Age 35. 5 yrs. Apprentice & 3 yrs. Improver, railway workshops. 1½ yrs. Chargeman, 4 yrs. Asst. Foreman & 12 yrs. Foreman, ordnance factory—ferrous & non-ferrous melting, rolling, foundry, smith, drop stamping, heavy forge press. Consid. exper. Mech. Handling, plant layout & forging techniques. Seeks post as **FOREMAN/MANAGER.** London area.

Ref. B.417. British. Male. Married. Age 41. M. Inst. Pet., M.Soc. Inst. Technology. 5 yrs. Plant Inst. Engr., oil refiners. 3 yrs. Manager, Inst. Dept., oil & bitumen refinery. 4 yrs. Inst./Appl. Engr., responsible for projects & plant commission, oil refinery & chem. Plant constructors. 2 yrs. Instrument Engr., electricity supply. At present Instrument Engr. (Applications & Export Sales), instrument mnfrs. Seeks post as **INSTRUMENT ENGR./MANAGING.** U.K. £1,500 p.a.

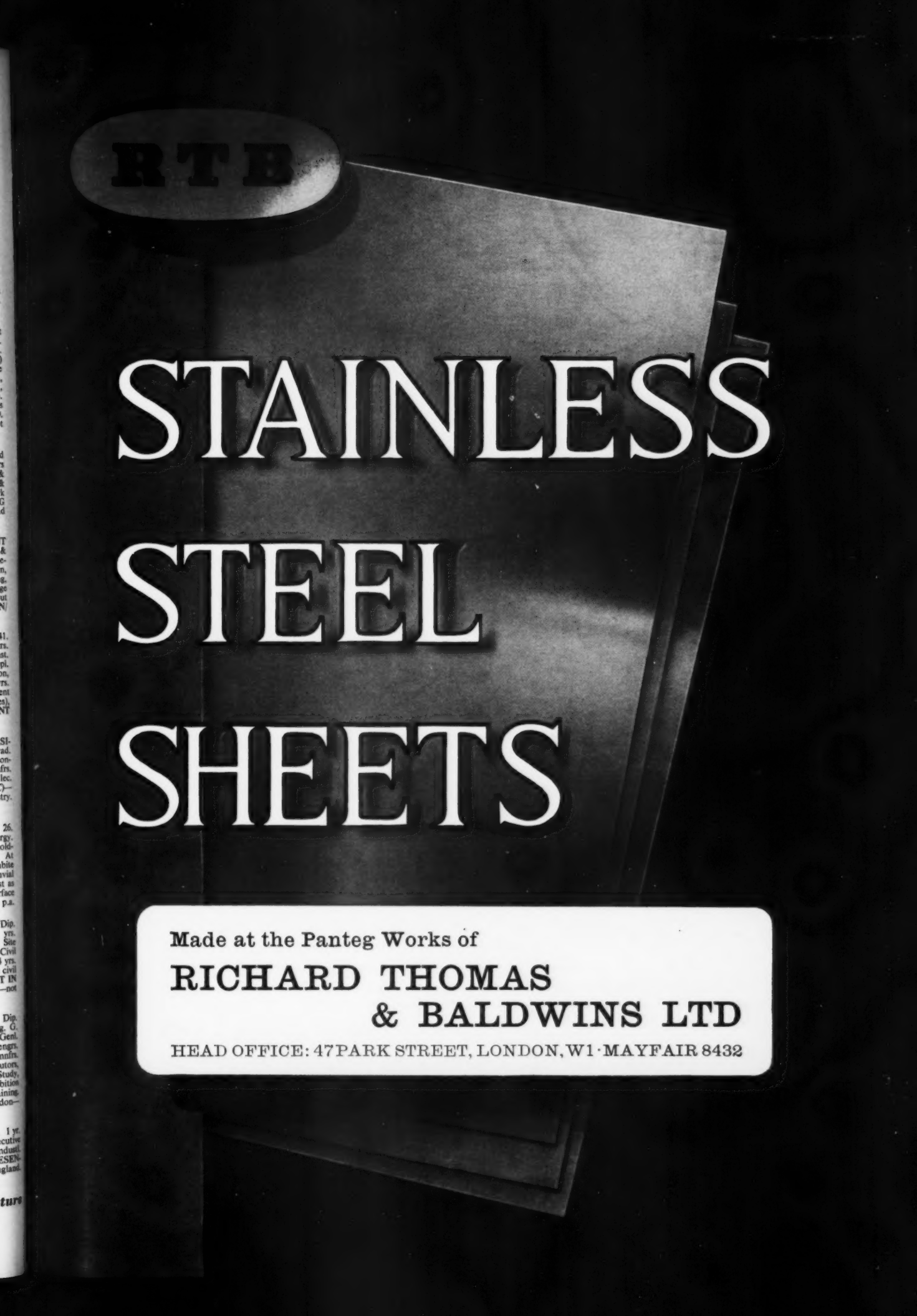
Ref. B.418. Indian. Male. Single. Age 38. **RESIDENT U.K.** B.Sc. (Chem.). India, & Post Grad. course at Swiss University. F. Chem. Soc. of Londone. 1 yr. Power Station Chemist, chem. mnfrs. 4½ yrs. Sales Organiser, pharmaceutical & elec. concern. Seeks post as **CHEMIST (ORGANIC)**—pref. to work on aspects of Polymer Chemistry. London. £25 per week.

Ref. B.419. British. Male. Married. Age 26. A.R.S.M., S.M. Inst. Mining & Metallurgy. F. London Geological Soc. Vacation exper. gold-mining in Ghana & mining Devpt. in Canada. At present Mining Engr., alluvial cassiterite & columbite producers, Africa. Exper. most methods of alluvial prospecting, extraction & treatment. Seeks post as **MINING GEOLOGIST/MINING ENGR.** (Surface or underground.) W. Coast of Africa. £1,500 p.a.

Ref. B.420. British. Male. Married. Age 43. Dip. in Civil Engg., A.M.I.C.E., A.M.I. Str.E. 4½ yrs. D/man & Designer, RCC Designers, 1½ yrs. Site Engr., civil engg. contracting. 4½ yrs. Asst. Civil Engr., administration & engg., govt. service. 14 yrs. Civil Engr. & Head of Section, public works & civil engg., govt. service. Seeks **EXECUTIVE POST IN CIVIL ENGG.** U.K.—pref. West Country—not London. £1,500 p.a.

Ref. B.421. British. Male. Married. Age 56. Dip. Mech. & Marine Engg. C. & G. Mech. Eng. G. Inst. Mar.E. 4 yrs. Asst. Manager, 7 yrs. Genl. Manager & 2 yrs. Sales Manager, motor engrs. 7 yrs. Senr. Tech. Representative, motor mnfrs. 5 yrs. Genl. Manager, motor & truck distributors, engrs. & body builders. Consid. exper. Work Study, O. & M., design & construction special exhibition units, plant layout & tech. & sales staff training. Seeks **EXECUTIVE POST.** U.K.—not London—£1,000 p.a.

Ref. B.422. British. Male. Married. Age 26. 1 yr. Personal Asst., Journalist. 4½ yrs. Account Executive with Advertising Agency on Technical & Industl. Accounts. Seeks **TECHNICAL SALES REPRESENTATION OR ADVTG. POST.** U.K.—S. England. £1,000 p.a. min.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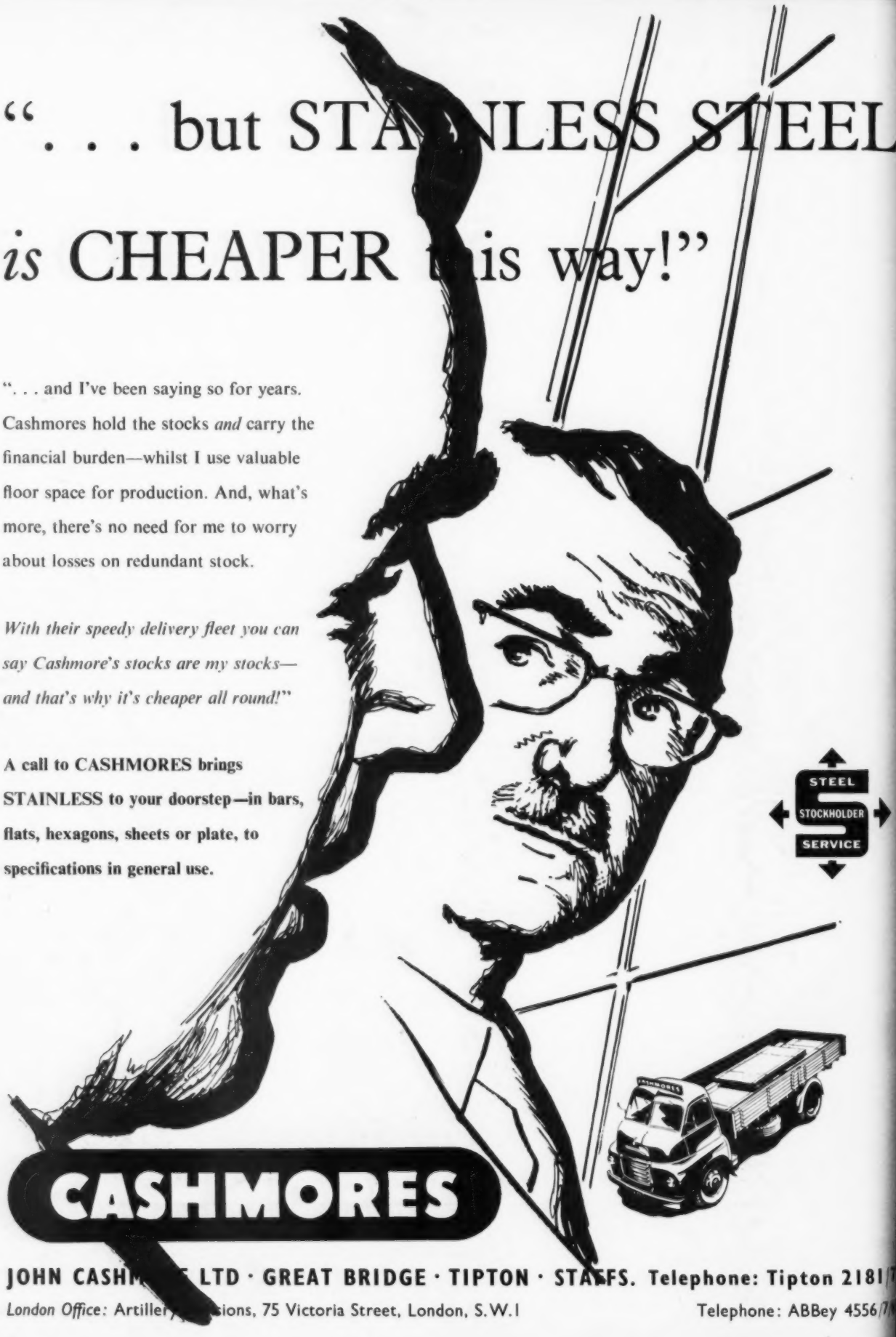

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